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Cutting Down Pig Iron Output

A 15 Per Cent. Curtailment Since February

Production in the Past Year About 29,750,000 Tons—The Iron Trade Quieter

The statistics for June show that the production of coke and anthracite pig iron was 2,265,000 gross tons, or 75,500 tons a day, against 77,100 tons a day in May. On July 1 269 furnaces were in blast, against 280 furnaces one month previous, and the daily capacity active was 73,700 tons, or about 3100 tons a day less than on June 1. The annual rate of production of all kinds of pig iron, estimating charcoal iron at 400,000 tons a year, was about 27,300,000 tons on July 1, against 28,450,000 tons one month previous. A number of furnaces have gone out in the past few days, so that the curtailment may now be reckoned at 15 per cent. from the high point, which was 31,650,000 tons a year in February. The movement will be carried further, as preparations are now being made for the blowing out of other furnaces.

The United States Steel Corporation now has 35 furnaces idle, against 31 on June 1, while at one time last month it had as few as 28 out of blast. The independent steel companies now have five more furnaces out than on June 1. Such statistics of stocks as are available point to a further increase in the Central West and the South, though it is not large.

We estimate the production of pig iron in the first half year, including charcoal iron, at 14,975,000 tons, or about 200,000 tons more than in the second half of 1909. In the past 12 months the country has produced about 29,750,000 tons of pig iron, or nearly 4,000,000 tons more than the highest record for a calendar year —25,795,000 tons in 1909.

The leading interest booked new business at an average rate of 26,000 tons a day in June, practically the same rate as in May, so that the mills are making a strong inroad upon contracts. As to the course of business in the summer months, forecasts are not enthusiastic, since several undetermined factors enter into the reckoning. Better things are generally looked for in the fall, contingent upon an average crop yield.

Among rail contracts of the week are 11,000 tons for the San Antonio & Aransas Pass Railway Company, 5000 tons for an American road of McKenzie & Mann and 2300 tons for the Wheeling & Lake Erie. Car contracts include 3000 for the Baltimore & Ohio, divided among three builders, while 1000 for the same road are about to be let. The Chesapeake & Ohio has bought 1500 cars.

The structural steel industry is still giving a good account of itself. A Chicago office building and a warehouse requiring together 5000 tons are under inquiry; buildings at Niagara Falls, Denver and Edgewater, N. J., calling for 1000 tons each, and the city hall at Oakland, Cal., 1500 tons.

Plate mills are figuring on 12,000 to 15,000 tons for four submarines for the Navy, and at Cleveland the Toledo Shipbuilding Company has placed 2500 tons

The concessions on plates and shapes recently reported continue and on the former have increased in some instances. Those on sheets are more marked on galvanized, which have sold at $4 a ton below the nominal level. Low prices on bar iron still prevail in Eastern and Western markets and these may account for the report of a concession on steel bars which has been received with skepticism in view of the very heavy bookings of most mills for the later months of the year.

At Pittsburgh, Bessemer and open hearth billets are weaker, the latter having sold at $27, the lowest price in many months.

Pig iron markets show considerable maneuvering by buyers, particularly in the Middle West, who seek to contract at present prices for delivery well into next year. Prices are weaker in spots, but producers sell grudgingly on this level for long deliveries. Some sales of Southern low grade irons have been made at fresh concessions. The market on steel making irons is very quiet. For June the Bessemer pig iron average was $15.62 at Valley furnace.

June shipments of Lake Superior ore made a new month's record at 7,316,679 tons. To July 1 the movement was 14,522,058 tons, or 5,819,735 tons more than to July 1, 1909.

The Quantity of Iron Ore Already Mined

From the preachings of those who would have the wheels of our blast furnace blowing engines stopped with a jar a generation or two hence by reason of the sudden exhaustion of all our iron ore reserves to the suggestions of Prof. Henry M. Howe that the earth itself is probably iron and that in time we shall likely be able to regain iron from the rust of that which we have once used is a far cry and practical considerations demand attention to the precise position which we occupy to-day. The facts need no further elaboration than that the value of an iron bearing material depends upon the cost of mining, distance from market and cost of conversion into the iron of commerce, and that all three governing influences vary with the progress of the race, the cost of mining lessening as methods are improved, the cost of transport to market decreasing as transportation methods improve and the market areas spread, and the cost of conversion being reduced as mechanical appliances and metallurgical processes are improved. It requires but the most rudimentary knowledge to observe that no limit can possibly be set to these advances. The known ores which are on the whole the most useful are used first, and improvements either keep pace with, or run in advance of, the requirements as to the use of less useful material.

As to discernible and, indeed, computable value, there is the dead level of the material which it is not necessary to use now and for which need in the near future cannot be foreseen. In general, the value of ore which is used is as much above this zero as the cost of delivering iron made from it is below the lowest cost obtainable with worthless material. This is the theoretical position at any time, and the difference in cost of making and delivering iron, or the value of ores, varies as the conditions from time to time vary.

In the progress from the use of the best ore that has ever been found to the use of the poorest material it may in future become necessary to use, some ground has been covered. Taking the average of all ores mined and used in the United States, the cost of mining has increased, the distance traveled to blast furnace has increased, the iron content has decreased and the amount of impurities has increased. It is not as generally realized as it should be that considerable ground has already been covered in these respects. One factor of several involved is the actual tonnage of ore which has been mined, and such data as are available have been condensed in the table below. Statistics of the iron ore production of the United States have been gathered annually only since 1889, while statistics of the Lake Superior movement have been collected from the beginning. For a report to the National Conservation Commission, C. W. Hayes prepared a statement of the production of iron ore in the United States from 1810 to date, the production prior to 1889 being computed from the pig iron production, and therefore including imports. The inclusion of imports is negligible on account of the smallness of the figures in the early years, and from other considerations. Using Mr. Hayes' figures for the earlier years, and deducting Lake Superior shipments to arrive at an approximation for the remainder of the country, we have constructed the table below:

Approximate Iron Ore Production in the United States.

	Lake Superior. Gross tons.	Remainder. Gross tons.	United States. Gross tons.
1810-1879	13,078,056	80,348,471	93,426,527
1880-1889	33,282,337	57,761,517	91,043,854
1890-1899	105,999,198	57,989,995	163,989,193
1900-1909	297,287,452	87,391,597	384,679,049
1810-1909	449,647,043	283,491,580	733,138,623

Ninety per cent. of the Lake Superior production up to 1879 was in the 14 years after 1865, and it was not until 1890 that the Lake Superior production was clearly in excess of that of the remainder of the country. Of the 449,647,043 tons shipped by the Lake Superior region to the end of last year, 195,703,424 tons has been from the Mesaba range and 253,943,619 tons from the remainder of the region.

The first estimate of the total reserves of the Lake Superior region was half a billion tons for the Mesaba range and a quarter billion for the old ranges. That was made at a time when the Mesaba was very young, while the old ranges had shipped about 100,000,000 tons. Since then, therefore, about 150,000,000 tons has been shipped from them. Had the known ore in the old ranges not increased, there would now be left but 100,000,000 tons, and it is questionable whether the present reserves, of quality at all comparable with that of the ores now being brought down, are greatly in excess of that figure.

As to the Mesaba, the 200,000,000 tons thus far mined has not effected any practical reduction in the reserves, for the reason that the proving up of new ore year by year has kept ahead of the production, so that the known reserves have increased year by year. The additions have been much larger than the subtractions, but on the other hand, the average quality, having regard to the three items—cost of mining, iron content and impurities—of the discoveries has been much below that of the 200,000,000 tons mined.

The reputation which the Mesaba range quickly made as a cheap producer of excellent iron ore has survived to such an extent that full value is frequently not given, in current thought, to the fact that of the

best ores of the region a total of 200,000,000 tons has been taken away, and more than 95 per cent. of this 200,000,000 tons in the past 13 years. This has subtracted a great deal from the quality of Mesaba ores, as originally established, although the visible supply has meanwhile increased.

Our table throws an interesting light upon the mining of ore outside the Lake Superior region. Of course up to 1879 the Lake Superior region was a minor factor. In the eighties it became important, and in the nineties it bore the entire increase in demand, so that the production outside the Lake Superior region was practically identical in the two decades. There was, however, a shifting of the position, for the Lake Superior region reduced production at many points, and this loss chanced to be made up by the rise of the South. In the succeeding decade there was an increase, for the regions which increased in the nineties continued to increase, while the regions which lost in the nineties had little, if anything, more to lose.

The fact that nearly 300,000,000 tons of ore has been mined in the United States outside the Lake Superior region does not mean that much has been done toward the exhaustion of the deposits, for in the main they have suffered less from this than from the competition of the Lake Superior ores. The time will come, although far in the future, when the best of the remaining Lake Superior ores, still a large tonnage, will be able to do no more than compete on even terms with many workings elsewhere which were abandoned in the eighties and nineties.

Preparedness

To urge any one nowadays to "make hay while the sun shines" or to "prepare for war in times of peace" is almost to invite rough treatment. We have all been warned so many times to look ahead a little way and to prepare for the rainy day that it has become a point on which we are apt to be rather irritable. Yet there are few things that do one more good than an occasional "punching up," and if there is anything about which we need to be constantly reminded it is preparedness.

We are always building for the morrow. The row of bricks we cement into position to-day is to bear the burden of those to be built above it; the decisions we make to-day stand or fall to our benefit or sorrow in proportion to the worth of the judgment which makes them. We have had the example only recently of the commendable action of the managers of a great steel corporation, who accumulated a huge surplus for the purpose of fortifying the future of the business, withholding much money which would otherwise have gone to the stockholders as dividends, and perhaps seriously weakened the corporation in the very next period of stress. The wisdom of such a policy is apparent.

In just what way this money shall be spent is, however, a far more difficult problem than it is to decide at the board meeting whether or not to set aside such a sum, and how much it shall be. The belief in the wisdom of the policy is more widespread than is the sagacity necessary to distribute the amount in such a way as to assure maximum returns.

In manufacturing goods having a highly competitive market the getting of orders is often governed by but small differences in quotations, especially in cases where price is considered more important than quality. Although a manufacturer's quotation is but 5 cents per 1000 higher than his competitor's, it gives the latter the business and brings the former one more "lost sales" report from his agent. By and by these reports come in so thick and fast and the factory is running on short time so much that the manufacturer is forced to take notice. He asks himself why it is that the other fellow can underbid him and decides, as he must, that it is simply because the competitor can produce the goods more cheaply than he can. And ten to one the competitor can do so because he has at least kept up to date.

The absolute necessity of a manufacturer's taking immediate advantage of the latest machinery and methods cannot be too strongly urged. This does not mean to purchase new and improved machinery haphazard, nor to fit up at once for any revolutionary process that may offer glittering theoretical possibilities of reducing costs. It does mean, however, that a constant study should be made of the cost of his product and of the demands of the market. It is a very simple matter for him to compute how much he can afford to pay for machinery which will reduce his cost a certain rate per 1000 of product. In some cases a new machine may pay for itself in less than six months, in others it may take longer, but one must look further than this to see all the benefit which the new machine brings. It may be and often is the only way of obtaining and holding the very kind of business for which the factory is, in the main, equipped to produce and upon which the existence of the establishment depends. To succeed and to hold success, there must sooner or later (and preferably sooner) be this constant study of cost reduction, or increase in efficiency, which means the same. Just how near to the ebb the tide of a man's business is at times he can only guess, but it is certain that if he has built up his strength and properly directed his skill he can comfortably ride the waves until the tide flows his way again.

The Striker Apprentice

In works where indentured apprentices are employed a strike brings grievous injustice to the boys whom the union impels by threat or cajolery to go out with the journeymen. It is a poor beginning of a man's career to break his first business contract. The apprentice and his guardians have put their signatures to a formal agreement and have given bond for the completion of the contract, either in cash or in the form of the indorsement of a person presumed to be able to meet the obligation should the necessity arise. A moral as well as a financial responsibility is created, which the union disregards.

Neither the union officers nor the journeymen members stand to forfeit nearly as much as the apprentice. The official is seeking nothing in the way of labor except that which accompanies his position. The journeyman feels that he can get work somewhere, whether or not the strike succeeds. No contract exists between him and his employer which cannot be quickly terminated. In sharp contrast is the position of a striking apprentice. Not only does he forfeit his bond, but he blots his reputation as a workman. He is young, perhaps too young to realize what he is doing, and he is led by his elders to strike for them, not for himself.

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They apply a form of intimidation which, judging from recent experience, requires exceptional courage to put aside. Stationed as a picket in front of a machine shop within the past week was a machinist's apprentice whose contract the owner holds, assured by somebody's bond. The union is responsible for the presence of the boy in such an indefensible occupation. It is often difficult for strikers to regain the positions which they have voluntarily abandoned. The case of a striking apprentice is an extreme one, and seldom is he permitted to return to his home shop.

A New Metal Company.—The Kroenert Smelting & Refining Company is now operating its new plant at 6620-6624 Kelly street, East Liberty, Pittsburgh. The company erected a building, 50 x 75 ft., and equipped it with two furnaces for smelting and refining metals, one crucible furnace and babbitt and solder kettles. M. M. Kroenert is president; E. J. Forse, vice-president; G. A. Kroenert, secretary and treasurer, and Joseph J. McDermott, superintendent. Mr. McDermott for years had charge of a Western company's plant, operating in the same line of business. Among the products the company will deal in are terne metal, solder, babbitt, pig lead, type metal, aluminum and aluminum solder, &c.

The Pontiac Foundry Company, Pontiac, Mich., is receiving bids for the construction of a foundry building, 70 x 300 ft.

Pig Iron Production

A Further Decrease in June

Daily Capacity Falls Off 3100 Tons and Is Still Declining

Our pig iron statistics for June show that the production of coke and anthracite pig iron was 2,265,478 gross tons, or 75,516 tons a day, against 77,102 tons a day in May. On July 1, 269 furnaces were in blast, against 280 furnaces one month previous, and the daily capacity active was 73,762 tons, or about 3,100 tons a day less than on June 1, when the figure was 76,846 tons. The annual rate of production of all kinds of pig iron, estimating charcoal iron at 400,000 tons a year, was about 27,300,000 tons on July 1, against 28,450,000 tons one month previous. The reduction in rate of output from the high point, which was 31,650,000 tons a year in February, was nearly 14 per cent. up to July 1. A number of furnaces have gone out in the past few days, so that the curtailment may now be reckoned at 15 per cent. On February 1, 313 coke and anthracite furnaces were in blast. The net reduction to July 1 was, therefore, 44.

We estimate the production of all kinds of pig iron in the first half of 1910 at 14,975,000 gross tons. The comparison with the official figures for the second half of 1909 is as follows:

Second half of 1909	14,773,125
First half of 1910, estimated	14,975,000
Estimated production for 12 months	29,748,125

These figures show that the highest production for

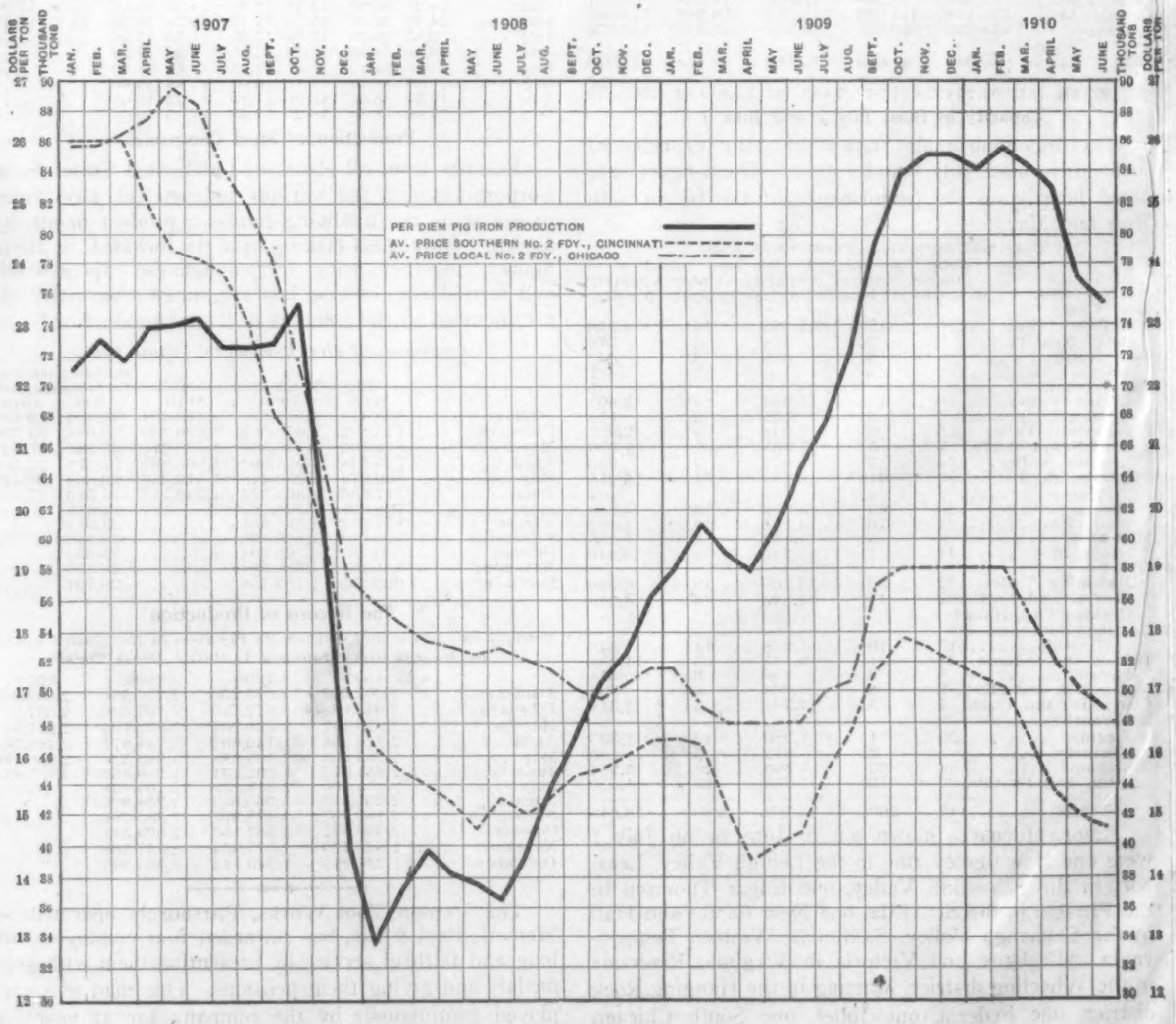
1907
1908
1909
1910
DOLLARS PER TON
THOUSAND TONS
JAN. FEB. MAR. APRIL MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.
PER DIEM PIG IRON PRODUCTION
AV. PRICE SOUTHERN No. 2 FDY., CINCINNATI
AV. PRICE LOCAL No. 2 FDY., CHICAGO

Diagram of Daily Average Production by Months of Coke and Anthracite Pig Iron in the United States from January 1, 1907, to July 1, 1910; Also of Monthly Average Prices of Southern No. 2 Foundry Iron at Cincinnati and Local No. 2 Foundry Iron at Chicago.

a calendar year, 25,795,471 tons in 1909, has been exceeded in the past 12 months by nearly 4,000,000 tons.

Daily Rate of Production

The daily rate of production of coke and anthracite pig iron by months, beginning with June, 1909, is as follows:

Daily Rate of Pig Iron Production by Months.—Gross Tons.

	Steel Works.	Merchant.	Total.
June, 1909	45,507	19,149	64,656
July	48,670	19,123	67,793
August	51,354	21,192	72,546
September	55,361	24,146	79,507
October	57,067	26,789	83,856
November	55,333	28,584	84,917
December	57,058	27,964	85,022
January, 1910	57,200	26,948	84,148
February	57,876	27,740	85,616
March	56,113	28,346	84,459
April	55,663	27,129	82,792
May	52,235	24,867	77,102
June	51,637	23,879	75,516

June Output by Districts

The table below gives the production of all coke and anthracite furnaces in June and the four months preceding:

Monthly Pig Iron Production.—Gross Tons.

	February. (28 days)	March. (31 days)	April. (30 days)	May. (31 days)	June. (30 days)
New York	136,470	180,005	166,307	171,461	163,575
New Jersey	26,102	29,557	29,092	22,973	18,443
Lehigh Valley	54,028	52,224	64,910	70,344	66,944
Schuylkill Val.	53,996	62,865	61,084	65,725	60,349
Lower Susquehanna and Lebanon Val.	64,054	70,738	71,694	65,667	60,315
Pittsburgh dis.	541,791	592,494	543,531	510,514	483,909
Shenango Val.	137,095	137,315	124,440	120,301	130,290
West. Penn	133,266	143,308	141,246	144,578	132,344
Md., Va. and Kentucky	66,454	78,761	77,032	82,071	82,181
Wheeling dis.	120,038	113,753	106,736	94,217	76,166
Mahoning Val.	220,779	241,653	225,588	218,243	208,988
Central and North. Ohio	201,462	218,660	181,805	144,344	145,393
Hocking Valley, Hanging Rock and S.W.Ohio	42,876	47,935	48,264	43,290	41,521
Mich.,Minn.,Mo., Wis., Colo.	65,363	77,209	75,802	71,588	68,051
Chicago dis.	322,196	348,972	351,272	358,509	328,953
Alabama	154,337	180,836	173,071	165,937	160,970
Tenn., Georgia and Texas	36,949	41,664	41,889	40,418	37,086
Totals	2,397,254	2,617,949	2,483,763	2,390,180	2,265,478

Capacity in Blast July 1 and June 1

The following table shows the daily capacity of furnaces in blast July 1 and June 1. These figures are based largely on the performance of the furnaces in June and May:

Coke and Anthracite Furnaces in Blast.

Location of furnaces.	Total number of stacks.	July 1. Number in blast.	July 1. Capacity per day.	June 1. Number in blast.	June 1. Capacity per day.
New York:					
Buffalo	16	15	5,085	14	4,956
Other New York	7	3	558	3	574
New Jersey	8	3	615	3	642
Spiegel	2	..	....	..	....
Pennsylvania:					
Lehigh Valley	23	14	2,064	14	2,095
Spiegel	3	2	155	3	174
Schuylkill Valley	16	8	1,962	9	2,023
Low. Susquehanna	7	5	1,053	5	1,090
Lebanon Valley	10	7	957	7	956
Pittsburgh dist	50	41	16,130	41	16,015
Spiegel	3	2	281	3	464
Shenango Valley	29	14	3,809	16	4,146
West. Penn	27	16	4,285	17	4,192
Maryland	4	4	1,162	4	1,165
Wheeling dist.	14	7	2,340	8	3,040
Ohio:					
Mahoning Valley	22	20	7,260	19	6,940
Central and North.	22	14	4,846	14	4,940
Hocking Val., Hanging Rock and S. W. Ohio	15	10	1,238	11	1,345
Illinois and Indiana	31	21	9,135	26	11,251
Spiegel	3	3	330	3	314
Mich., Wis. and Minn.	9	6	1,064	5	894
Colo., Mo. and Wash.	7	5	1,301	5	1,311
The South:					
Virginia	23	11	1,280	12	1,395
Kentucky	5	2	312	2	290
Alabama	46	23	5,365	23	5,384
Tenn. and Georgia	20	13	1,235	13	1,310
Totals	413	269	73,762	280	76,846

Among furnaces blown out in June or on July 1 were one New Jersey zinc in the Lehigh Valley, Leesport in the Schuylkill Valley, one Edgar Thomson in the Pittsburgh district, Ella, one New Castle and Hall in the Shenango Valley, Saxton in Western Pennsylvania, Alleghany and Victoria in Virginia, Riverside in the Wheeling district, Marting in the Hanging Rock district, one Federal, one Joliet, one South Chicago and two Gary in the Chicago district, and Rockdale in Tennessee.

Among furnaces blown in were one Niagara in the Buffalo district, one Duquesne in the Pittsburgh district, one Ohio in the Mahoning Valley, one New Castle in the Shenango Valley, Buena Vista in Virginia, one Mayville in Wisconsin.

The Curves of Pig Iron Production and Prices

The curve of pig iron production from January, 1907, to the present time is shown in the accompanying chart. The figures plotted are those of daily average production, by months, of coke and anthracite iron. The two other curves on the chart represent monthly average prices of Southern No. 2 foundry pig iron at Cincinnati and of local No. 2 foundry iron at Chicago. They are based on the weekly market quotations of *The Iron Age*. The two sets of figures are as follows:

Daily Average Production of Coke and Anthracite Pig Iron in The United States by Months Since January 1, 1907.—Gross Tons.

	1907.	1908.	1909.	1910.
January	71,149	33,718	57,975	84,148
February	73,038	37,193	60,976	85,616
March	71,821	39,619	59,232	84,459
April	73,885	38,289	57,962	82,792
May	74,048	37,603	60,753	77,102
June	74,486	36,444	64,656	75,516
July	72,763	39,287	67,793	.....
August	72,504	43,851	72,546	.....
September	72,783	47,300	79,507	.....
October	75,386	50,554	83,856	.....
November	60,937	52,595	84,917	.....
December	39,815	56,158	85,022	.....

Monthly Average Prices in Dollars of Southern No. 2 Foundry Iron at Cincinnati and Local No. 2 Foundry at Chicago Since January, 1907.

	1907.		1908.		1909.		1910.	
	Sou. No. 2 Cin.	Loc. No. 2 Chi.	Sou. No. 2 Cin.	Loc. No. 2 Chi.	Sou. No. 2 Cin.	Loc. No. 2 Chi.	Sou. No. 2 Cin.	Loc. No. 2 Chi.
Jan.	26.00	25.85	16.15	18.45	16.25	17.35	17.25	19.00
Feb.	26.00	25.85	15.75	18.16	16.13	16.75	17.06	19.00
March	26.00	26.10	15.50	17.85	15.05	16.50	16.30	18.30
April	25.06	26.35	15.20	17.73	14.25	16.50	15.37	17.50
May	24.25	26.85	14.75	17.63	14.50	16.50	15.00	17.06
June	24.10	26.60	15.25	17.73	14.70	16.50	14.85	16.75
July	23.85	25.55	15.00	17.55	15.75	17.00	....	....
Aug.	23.60	24.85	15.25	17.35	16.38	17.13	....	....
Sept.	21.50	24.10	15.65	17.05	17.35	18.70	....	....
Oct.	20.95	22.45	15.75	16.85	17.88	19.00	....	....
Nov.	19.50	20.66	16.00	17.10	17.75	19.00	....	....
Dec.	17.00	18.80	16.25	17.35	17.45	19.00	....	....

Production of Steel Companies

Returns from all plants of the United States Steel Corporation and the various independent steel companies show the following totals of product month by month. Only steel-making iron is included in these figures, together with ferromanganese, spiegeleisen and ferrosilicon. These last are stated separately, but are included in the columns of "total production."

Production of Steel Companies.—Gross Tons.

	Pig.—Total production.—			Spiegeleisen and ferromanganese.	
	1908.	1909.	1910.	1909.	1910.
January	664,415	1,117,823	1,773,201	12,325	19,538
February	745,802	1,073,363	1,620,539	10,046	21,396
March	841,502	1,140,558	1,739,212	23,743	25,591
April	725,548	1,093,092	1,669,898	22,478	22,304
May	759,674	1,256,448	1,819,283	20,834	26,529
June	717,689	1,365,527	1,549,112	16,516	27,680
July	798,639	1,508,762	.....	17,613	.....
August	897,052	1,591,991	.....	22,313	.....
September	933,514	1,660,839	.....	28,148	.....
October	996,481	1,769,094	.....	25,384	.....
November	981,167	1,689,994	.....	23,376	.....
December	1,090,339	1,768,799	.....	20,791	.....

The Record of Production

Production of Coal and Anthracite Pig Iron in the United States by Months Since January 1, 1907.—Gross Tons.

	1907.	1908.	1909.	1910.
January	2,205,607	1,045,250	1,797,560	2,608,605
February	2,045,068	1,077,740	1,707,340	2,397,254
March	2,226,457	1,228,204	1,832,194	2,617,949
April	2,216,558	1,149,602	1,738,877	2,483,763
May	2,295,505	1,165,688	1,883,330	2,390,180
June	2,234,575	1,092,131	1,930,868	2,265,478
July	2,255,660	1,218,129	2,103,431	.....
August	2,250,410	1,359,831	2,248,930	.....
September	2,183,487	1,418,998	2,385,200	.....
October	2,336,972	1,567,198	2,599,541	.....
November	1,828,125	1,577,854	2,547,508	.....
December	1,234,279	1,740,912	2,635,680	.....

The Verona Tool Works, Pittsburgh, operated by Metcalf, Paul & Co., has rewarded four employees for long and faithful service by presenting them with gold medals and giving them pensions. One man was employed continuously by the company for 37 years, a second for 36 years, a third for 35 years and a fourth for 29 years.

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May Exports and Imports of Iron and Steel

As compared with April, the May exports of iron and steel show an increase and the imports a decrease, according to the report of the Bureau of Statistics of the Department of Commerce and Labor. The value of the exports of iron and steel and manufactures thereof, not including iron ore, was $17,658,042 in May, against $16,529,254 in April, while the value of similar imports was $3,486,336 in May, against $3,710,614 in April.

The exports of commodities for which quantities are given totaled 135,344 gross tons in May, against 117,918 tons in April and 124,753 tons in March. The details of the exports of such commodities for May and for the 11 months of the fiscal year ending with May are as follows, compared with the corresponding periods of the previous year:

Exports of Iron and Steel.

	May,		11 mos. ending May,	
	1910.	1909.	1910.	1909.
	Gross tons.	Gross tons.	Gross tons.	Gross tons.
Pig iron	7,814	5,121	70,917	42,332
Scrap	3,687	3,819	14,508	21,192
Bar iron	2,057	1,297	14,644	10,535
Wire rods	1,834	1,427	22,442	11,196
Steel bars	8,201	4,763	81,062	45,461
Billets, blooms, &c.	180	13,981	49,313	98,757
Hoops, bands, &c.	600	269	4,659	3,213
Steel rails	35,516	30,794	344,186	213,315
Iron sheets and plates	8,834	5,447	87,893	51,027
Steel sheets and plates	13,315	8,478	128,924	70,764
Tin and terne plates	1,461	640	10,917	4,464
Structural iron and steel	15,750	5,643	104,742	92,654
Barb wire	7,349	4,645	67,407	60,162
Wire	8,233	8,717	73,009	63,661
Cut nails	1,031	848	8,449	7,034
Wire nails	4,996	1,580	34,093	24,349
All other nails, including tacks	1,185	592	7,666	6,087
Pipe fittings	13,301	11,788	150,778	118,312
Totals	135,344	109,849	1,275,609	944,515

The imports of commodities for which quantities are given totaled 45,021 gross tons in May, as compared with 51,438 tons in April and 57,150 tons in March. The details of such imports for May and for the 11 months ending with May, as compared with the corresponding periods of the preceding year, are as follows:

Imports of Iron and Steel.

	May,		11 mos. ending May,	
	1910.	1909.	1910.	1909.
	Gross tons.	Gross tons.	Gross tons.	Gross tons.
Pig iron	21,405	8,747	223,606	94,032
Scrap	3,253	642	116,370	5,132
Bar iron	4,304	500	29,962	14,050
Rails	540	6	6,844	1,292
Billets, bars and steel in forms n.e.s.	3,885	1,008	34,797	11,524
Sheets and plates	459	159	6,423	2,978
Tin and terne plates	7,086	6,487	63,553	46,724
Wire rods	2,174	692	14,040	10,519
Structural iron and steel	1,915	62	10,157	5,384
Totals	45,021	18,303	505,752	191,635

The imports of iron ore in May were 240,833 gross tons against 206,135 tons in April, 163,633 tons in March and 97,393 tons in the month of May, 1909. The total importations of iron ore for the 11 months ending with May were 2,188,261 gross tons, against 890,933 tons in the corresponding period of the previous year and 914,949 tons in the corresponding period of the fiscal year 1908. Of the May imports of iron ore 135,950 tons came from Cuba, 66,507 tons from Europe and 38,376 tons from British North America.

The total value of the exports of iron and steel and manufactures thereof, not including ore, for the 11 months ending with May, was $162,629,982, against $131,171,621 in the corresponding period of the previous year. In the same periods, respectively, the imports reached totals of $35,434,273 and $19,997,877.

The new blast furnace of the Worth Brothers Company, Coatesville, Pa., is now producing at a daily rate averaging between 350 and 400 tons. The stack is not being pushed, but is gradually being worked up to its intended capacity of 500 tons per day. Standard basic pig iron is being produced. The construction of a second furnace by this company is going forward rapidly. Foundation work for the necessary additions for the boiler and engine house has been practically completed, and a good portion of the structural work has been done. The plate work on the four hot blast stoves has been completed and the shell of the furnace stack is now being erected. It is hoped that this second furnace will be ready to blow in before the close of the year. An addition to the main office building of the company, which will double the present building, is now under way.

The Lake Superior Iron & Chemical Company

Rogers, Brown & Co. have been appointed sole selling agents for the charcoal pig iron of the Lake Superior Iron & Chemical Company, which on July 1 transferred its Michigan property to a company of the same name incorporated in New York. The sale included about 300,000 acres of woodland in fee and under contract, the Yale and Tyler's Fork iron mines, six charcoal blast furnaces, of which the Ashland makes the Hinkle brand, Manistique makes Champion, Newberry makes Michigan, Boyne City makes Pine Lake, Elk Rapids makes the same name and Chocolay the same name, also four chemical plants. The officers of the new company are as follows: John Joyce, president, Boston; W. H. Matthews, vice-president, Detroit; L. F. Knowles, secretary, Detroit, and A. Vanoss treasurer, Toronto. The annual capacity of the six furnaces is about 200,000 tons. They are favorably located to distribute the particular grades and furnish the analyses required by manufacturers of cylinders, automobiles, car wheels, &c.

The Western Steel Corporation Rolling Bars

The Western Steel Corporation, Seattle, Wash., began the operation of its 14-in. and 22-in. rolling mills at Irondale June 21, steel bars being the first product rolled. For a fortnight previous to this time the open hearth furnaces had been pouring steel and ingots had been accumulated awaiting the operation of the rolling mills. From this time on, it is stated, there will be steady operation of both the open hearth furnaces and the rolling mills. The company is now practically in the field for the filling of orders for manufactured steel. A considerable tonnage is already upon its books. An average analysis of the steel thus far produced at Irondale is as follows: Carbon, 0.22; manganese, 0.50; phosphorus, 0.01; sulphur, 0.032. The blast furnace at Irondale, it is expected, will be put in blast this week.

The Vulcan Steam Shovel Company will move its plant from Toledo, Ohio, to Evansville, Ind., about January 1. The ownership of this company and of the Bucyrus Steam Shovel Company, South Milwaukee, is practically identical, and the object of changing the location is to have a plant more convenient to the Southern trade. A site and bonus were given by citizens of Evansville to secure the plant. The Toledo plant will be dismantled and the machinery moved to Evansville.

The Columbia Tool Steel Company, Chicago Heights, Ill., is erecting a building with 5000 sq. ft. of floor space to be used for machine shop and storehouse purposes. No additional equipment will be installed, as the extra space will be used to relieve the present crowded condition of the company's shops.

The Iron and Metal Markets

A Comparison of Prices

Advances Over the Previous Month in Heavy Type, Declines in Italics.

At date, one week, one month and one year previous.

	July 6, 1910.	June 29, 1910.	June 1, 1910.	July 7, 1909.
PIG IRON, Per Gross Ton:				
Foundry No. 2, standard, Philadelphia	*$16.25*	$16.25	$17.00	$16.50
Foundry No. 2, Southern, Cincinnati	14.75	14.75	14.75	15.75
Foundry No. 2, local, Chicago	16.75	16.75	16.75	17.00
Basic, delivered, eastern Pa.	*15.75*	15.75	16.25	15.50
Basic, Valley furnace	*14.50*	14.50	15.00	15.00
Bessemer, Pittsburgh	*16.40*	16.40	16.90	16.15
Gray forge, Pittsburgh	*14.90*	14.90	15.40	14.65
Lake Superior charcoal, Chicago	18.50	18.50	18.50	19.50
BILLETS, &c., Per Gross Ton:				
Bessemer billets, Pittsburgh	*25.00*	25.00	25.50	23.00
Forging billets, Pittsburgh	*30.00*	31.00	31.00	27.00
Open hearth billets, Philadelphia	*28.50*	28.50	29.00	25.00
Wire rods, Pittsburgh	*30.00*	31.00	31.00	29.00
Steel rails, heavy, at mill	28.00	28.00	28.00	28.00
OLD MATERIAL, Per Gross Ton:				
Steel rails, melting, Chicago	*13.50*	13.50	15.00	14.50
Steel rails, melting, Philadelphia	*14.25*	14.25	14.50	16.00
Iron rails, Chicago	17.00	17.00	17.00	17.00
Iron rails, Philadelphia	*19.00*	19.50	20.00	19.50
Car wheels, Chicago	*15.00*	15.50	15.50	16.00
Car wheels, Philadelphia	*14.50*	14.50	15.00	15.25
Heavy steel scrap, Pittsburgh	15.00	15.00	15.00	16.00
Heavy steel scrap, Chicago	*12.75*	12.75	13.50	14.00
Heavy steel scrap, Philadelphia	*14.25*	14.25	14.50	16.00
FINISHED IRON AND STEEL, Per Pound:	Cents.	Cents.	Cents.	Cents.
Refined iron bars, Philadelphia	*1.47½*	1.47½	1.52½	1.45
Common iron bars, Chicago	*1.40*	1.45	1.47½	1.35
Common iron bars, Pittsburgh	*1.50*	1.50	1.55	1.45
Steel bars, tidewater, New York	1.61	1.61	1.61	1.41
Steel bars, Pittsburgh	1.45	1.45	1.45	1.25
Tank plates, tidewater, New York	*1.61*	1.61	1.66	1.46
Tank plates, Pittsburgh	*1.45*	1.45	1.50	1.30
Beams, tidewater, New York	*1.61*	1.61	1.66	1.30
Beams, Pittsburgh	*1.45*	1.45	1.50	1.46
Angles, tidewater, New York	*1.61*	1.61	1.66	1.30
Angles, Pittsburgh	*1.45*	1.45	1.50	1.46
Skelp, grooved steel, Pittsburgh	1.50	1.50	1.50	1.30
Skelp, sheared steel, Pittsburgh	1.60	1.60	1.60	1.40
SHEETS, NAILS AND WIRE, Per Pound:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, Pittsburgh	*2.30*	2.40	2.40	2.20
Wire nails, Pittsburgh*	1.80	1.80	1.80	1.70
Cut nails, Pittsburgh	1.75	1.75	1.75	1.70
Barb wire, galv., Pittsburgh*	2.10	2.10	2.10	2.00
METALS, Per Pound:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York	*12.75*	12.75	13.00	13.25
Electrolytic copper, New York	*12.37½*	12.37½	12.75	13.00
Spelter, New York	*5.30*	5.20	5.30	5.35
Spelter, St. Louis	*5.05*	5.05	5.15	5.27½
Lead, New York	4.40	4.37½	4.37½	4.35
Lead, St. Louis	4.25	4.22½	4.22½	4.30
Tin, New York	*32.80*	33.00	32.90	29.00
Antimony, Hallett, New York	8.12½	8.12½	8.12½	7.50
Nickel, New York	45.00	45.00	45.00	45.00
Tin plate, 100 lb., New York	$3.84	$3.84	$3.84	$3.64

* These prices are for largest lots to jobbers.

Prices of Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16c.; Philadelphia, 15c.; Boston, 18c.; Buffalo, 11c.; Cleveland, 10c.; Cincinnati, 15c.; Indianapolis, 17c.; Chicago, 18c.; St. Paul, 32c.; St. Louis, 22½c.; New Orleans, 30c.; Birmingham, Ala., 45c. Rates to the Pacific Coast are 80c. on plates, structural shapes and sheets, No. 11 and heavier; 85c. on sheets, Nos. 12 to 16; 95c. on sheets, No. 16 and lighter; 65c. on wrought pipe and boiler tubes.

Structural Shapes.—I-beams and channels, 3 to 15 in., inclusive, 1.45c. to 1.50c., net; I-beams over 15 in., 1.60c., net; H-beams over 8 in., 1.70c.; angles, 3 to 6 in., inclusive, ¼ in. and up, 1.55c., net; angles over 6 in., 1.60c., net; angles, 3 x 3 in., and up, less than ¼ in., 1.70c., base, half extras, steel bar card; tees, 3 in. and up, 1.60c., net; zees, 3 in. and up, 1.55c., net; angles, channels and tees, under 3 in., 1.45c., base, plus 10c., half extras, steel bar card; deck beams and bulb angles, 1.80c., net; hand rail tees, 2.80c., net; checkered and corrugated plates, 2.80c., net.

Plates.—Tank plates, ¾ in. thick, 6¼ in. up to 100 in. wide, 1.45c. to 1.50c., base. Following are stipulations prescribed by manufacturers, with extras to be added to base price (per pound) of plates:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated February 6, 1903, or equivalent, ¼-in. thick and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per square foot are considered ¼-in. plates. Plates over 72 in. wide must be ordered ¼-in. thick on edge, or not less than 11 lb. per square foot, to take base price. Plates over 72 in. wide ordered less than 11 lb. per square foot down to the weight of 3-16-in. take the price of 3-16-in.

Allowable overweight, whether plates are ordered to gauge or weight, to be governed by the standard specifications of the Association of American Steel Manufacturers.

Gauges under ¼-in. to and including 3-16-in. on thinnest edge	$0.10
Gauges under 3-16-in. to and including No. 8	.15
Gauges under No. 8 to and including No. 9	.25
Gauges under No. 9 to and including No. 10	.30
Gauges under No. 10 to and including No. 12	.40
Sketches (including all straight taper plates), 3 ft. and over in length	.10
Complete circles, 3 ft. diameter and over	.20
Boiler and flange steel	.10
"A. B. M. A." and ordinary firebox steel	.20
Still bottom steel	.30
Marine steel	.40
Locomotive firebox steel	.50
Widths over 100 in. up to 110 in., inclusive	.05
Widths over 110 in. up to 115 in., inclusive	.10
Widths over 115 in up to 120 in., inclusive	.15
Widths over 120 in. up to 125 in., inclusive	.25
Widths over 125 in. up to 130 in., inclusive	.50
Widths over 130 in	1.00
Cutting to lengths or diameters under 3 ft. to 2 ft., inclusive	.25
Cutting to lengths or diameters under 2 ft. to 1 ft., inclusive	.50
Cutting to lengths or diameters under 1 ft.	1.55

No charge for cutting rectangular plates to lengths 3 ft. and over.

TERMS.—Net cash 30 days.

Sheets.—Minimum prices for mill shipments on sheets in carload and larger lots, on which jobbers charge the usual advances for small lots from store, are as follows: Black annealed sheets, Nos. 3 to 8, 1.70c.; Nos. 9 and 10, 1.75c.; Nos. 11 and 12, 1.80c.; Nos. 13 and 14, 1.85c.; Nos. 15 and 16, 1.95c. Box annealed sheets, Nos. 17 and 21, 2.10c.; Nos. 22 to 24, 2.15c.; Nos. 25 and 26, 2.20c.; No. 27, 2.25c.; No. 28, 2.30c.; No. 29, 2.35c.; No. 30, 2.45c. Galvanized sheets, Nos. 13 and 14, 2.50c.; Nos. 15 and 16, 2.60c.; Nos. 17 to 21, 2.75c.; Nos. 22 to 24, 2.90c.; Nos. 25 and 26, 3.10c.; No. 27, 3.20c.; No. 28, 3.40c.; No. 29, 3.50c.; No. 30, 3.75c. Painted roofing sheets, No. 28, $1.70 per square. Galvanized roofing sheets, No. 28, $3 per square, for 2½-in. corrugations.

Wrought Pipe.—The following are the discounts on the Pittsburgh basing card on carloads of wrought pipe now in effect:

	Steel. Black.	Steel. Galv.	Iron. Black.	Iron. Galv.
⅛ and ¼ in.	70	54	66	..
⅜ in.	71	57	67	53
½ in.	74	62	70	58
¾ to 6 in.	78	68	74	64
7 to 12 in.	72	57	68	53
Plugged and Reamed.				
1 to 4 in.	76	66	72	62
Extra Strong, Plain Ends.				
⅛ to ⅜ in.	63	51	59	47
½ to 4 in.	70	58	66	54
4½ to 8 in.	66	54	62	50
9, 10, 11 and 12 in.	54	42	..	..
Double Extra Strong, Plain Ends.				
⅛ to 8 in.	50	48	53	44

The above steel pipe discounts are for "card weight," subject to the usual variation of 5 per cent.

Boiler Tubes.—Discounts on lap welded steel and charcoal iron boiler tubes to jobbers in carloads are as follows:

	Steel.	Iron.
1 to 1¼ in.	49	43
1⅜ to 2¼ in.	61	48
2⅜ in.	63	48
2½ to 5 in.	69	55
6 to 13 in.	61	43

2½ in. and smaller, over 18 ft., 10 per cent. net extra.
2¾ in. and larger, over 22 ft., 10 per cent. net extra.

Less than carloads to destinations east of the Mississippi River will be sold at delivered discount for carloads lowered by two points, for lengths 22 ft. and under; longer lengths, f.o.b. Pittsburgh.

Wire Rods.—Bessemer, open hearth and chain rods, $30.

Steel Rivets.—Structural rivets, ¾-in. and larger, 2.15c., base; cone head boiler rivets, ¾-in. and larger, 2.25c., base; ⅝-in. and 11-16-in. take an advance of 15c., and ½-in. and 9-16-in. take an advance of 50c.; in lengths shorter than 1-in. also take an advance of 50 cents. Terms are 30 days, net cash, f.o.b. mill. The above prices are absolutely minimum on contracts for large lots, makers charging the usual advances of $2 to $3 a ton to the small trade.

THE IRON AND METAL MARKETS

Pittsburgh

PARK BUILDING, July 6, 1910.—(*By Telegraph.*)

Pig Iron.—There is little or no new inquiry for pig iron and not enough is being sold to establish a market. The Standard Sanitary Mfg. Company has not yet closed on its inquiry for 8000 tons of Northern No. 2 for its Allegheny and New Brighton works, but may buy before the day is over. It is understood that low prices have been named. Furnaces and dealers are not trying to force sales of pig iron at present, believing it is useless to do so under existing conditions. Stocks of pig iron in June showed an increase over May, and it is believed that further restriction in output will have to be made before the market can improve. We quote standard Bessemer iron at $15.50 to $15.75; malleable Bessemer, $15 to $15.25; basic, $14.50 to $14.75; No. 2 foundry, $14.50 and gray forge, $14, all at Valley furnace, with a freight rate of 90c. a ton for delivery in the Pittsburgh district.

Steel.—The market is extremely quiet, very few new inquiries being out, and prices on both Bessemer and open hearth steel are weak. We quote Bessemer billets at $25 and sheet bars at $26 to $26.50; 4 x 4 in. open hearth billets, $27 to $27.50; open hearth small billets, $28 to $28.50; open hearth sheet and tin bars, $28 to $28.50; forging billets, $30 to $31, all f.o.b. Pittsburgh, freight to destination added.

Coke.—A local dealer closed a contract this morning for a round tonnage of 72-hour foundry coke for delivery over the year beginning July, on the basis of $2.25 per net ton at oven. The inquiry of the Westinghouse Electric & Mfg. Company for foundry coke is based on a maximum of 12 cars a week for the year beginning July and which will amount to close to 15,000 tons for the year. It is probable, though, that the actual tonnage involved will not amount to over 12,000. Bids have gone in on this inquiry on the basis of $2.25 per net ton, at oven, for standard 72-hour foundry, and the contract may be placed this week.

(*By Mail.*)

The second half of the year opens up with very quiet conditions. The outlook does not promise much activity through July, while August may also be dull. A good many finishing mills shut down June 30 for inventory and repairs, and of course will not take in any material for the next two or three weeks or until they start up again. The Republic Iron & Steel Company has closed its Bessemer plant and some of its finishing mills in the Youngstown district, and they will probably be shut down about two weeks. The Pittsburgh Steel Company has closed its open steel plant, rod and wire mills at Monessen, Pa., and they will be closed down for the next two weeks or longer. As yet no settlement has been reached between the mills in the Western Bar Iron Association and the Amalgamated Association on the wage scale, but this does not mean that the union bar iron mills will shut down, as there is a provision in the scale by which they can run until an agreement is reached. A leading consumer is still in the market for 7000 to 8000 tons of Northern foundry pig iron for last half of the year delivery, and the inquiry of about three weeks ago of the Colona, Pa., interest for a large tonnage of basic iron has not yet been closed. The steel market is quiet, and prices on both Bessemer and open hearth steel are weak. Standard 4 x 4 in. open hearth billets could readily be had to-day at $27, Pittsburgh, the lowest price that has ruled in this market for some time. Little is doing in scrap or coke, but some inquiries are in the market for foundry coke for last half of the year.

Ferromanganese.—There is little or no new inquiry and prices continue weak. We quote foreign 80 per cent. ferro for delivery over balance of this year at $39 to $39.50, Baltimore, carrying a freight rate of $1.90 a ton for delivery in Pittsburgh district.

Ferrosilicon.—Aside from a sale of 25 tons of 50 per cent. at $57.50, Pittsburgh, for delivery during July, nothing of moment has been done in this material in the past week. The market is weak and we quote 50 per cent. ferrosilicon at $57.50 to $58, delivered, Pittsburgh. We quote 10 per cent. at $23; 11 per cent., $24, and 12 per cent., $25, all at Ashland furnace, to which $1.90 a ton should be added for delivery in the Pittsburgh district.

Rods.—The dull condition existing in the wire trade is reflected in rods, the demand for which is light and confined to small lots. We quote Bessemer and chain rods at $30 to $31, and open hearth rods at $31 to $32, Pittsburgh.

Skelp.—The mills rolling wide sizes of sheared iron and steel skelp are pretty well filled up for the next several months on recent contracts placed, and against which specifications are being received freely. For ordinary widths and gauges we quote grooved steel skelp at 1.50c. to 1.55c.; sheared steel skelp, 1.60c. to 1.65c.; grooved iron skelp, 1.80c., and sheared iron skelp, 1.90c., all f.o.b. mill, Pittsburgh.

Steel Rails.—The past week has been quiet, new orders for light rails amounting to about only 2000 tons and no contracts of importance for standard sections have been placed. The demand for track supplies continues heavy, especially for splice bars, for which the Carnegie Steel Company has recently entered some good orders. We quote steel axles at 1.75c. to 1.80c., and splice bars, 1.50c., at mill, Pittsburgh. Light rail prices are as follows: 8 to 10 lb., $32; 12 to 14 lb., $29; 16, 20 and 25 lb., $28; 30 and 35 lb., $27.75, and 40 to 45 lb., $27, Pittsburgh. These prices are for 250-ton lots and over, and for small lots premiums of 50c. per ton and more are being paid. We quote standard sections at $28, at mill.

Structural Material.—A contract for about 1500 tons of steel for a bridge for the Erie Railroad for its Mahoning Division was the only contract of importance placed. Inquiries are active, and the two leading local fabricators are pretty well filled up for the next three months or longer. We quote beams and channels up to 15-in. at 1.45c. to 1.50c., Pittsburgh.

Plates.—Local mills are bidding on 12,000 to 15,000 tons of plates for four submarines to be built for the Navy, and another inquiry is up to the local mills for 2000 to 2500 tons of ship plates. The only car orders of importance in the past week were the Baltimore & Ohio for 1000 all steel coke cars, placed with the Pressed Steel Car Company, 1000 coal and coke cars with the Cambria Steel Company, 1000 steel underframe cars with the Standard Steel Car Company, and the Chesapeake & Ohio for 1500 50-ton cars with the Standard Steel Car Company. The plate mills are pretty well filled up with orders for July and August, but have little on their books for last quarter. We quote ¼-in. and heavier plates in the narrower sizes at 1.40c. to 1.45c., and wide sizes at 1.45c. to 1.50c., Pittsburgh.

Sheets.—Reports were current last week that several of the leading sheet mills had made a reduction of $2 a ton on black and galvanized sheets, but this is officially denied. The report probably arose from the fact that for some time the prices on the lighter gauges of black and galvanized sheets have been shaded $2 to $3 a ton by a few of the mills, and these concessions are now being met by several of the larger interests. The new demand for sheets has fallen off a good deal, and there is no trouble now in getting prompt deliveries in blue annealed and electric sheets. The official price of No. 28 black sheets is 2.40c., but a good many mills are entering orders at 2.30c., and the regular price on galvanized No. 28 is 3.50c., but orders are being taken at 3.40c. or less.

Tin Plate.—This is probably the most active item on the whole list, all the leading tin plate mills being in operation to full capacity, and with about enough business on their books to take their output for the balance of this year. New buying in tin plate is light, as the season is over, but consumers are specifying freely against their contracts, and most of the mills are behind in shipments. Prices are very firm, and we quote 100-lb. cokes at $3.60 per base box, f.o.b. Pittsburgh.

Bars.—Specifications on steel bars in June were extremely heavy, but will probably show a falling off during this month, as a good many consumers have closed their works for inventory and repairs and will not take in material until these have been completed. There is little new buying in iron bars, and a good many of the railroads have tonnage due them on old contracts, which should have been taken out prior to June 30. We quote steel bars at 1.45c. and common iron bars about 1.50c., Pittsburgh.

Hoops and Bands.—A good many contracts on hoops and bands expired June 30, and while some of these will be carried over, others will be canceled. We quote steel hoops for forward delivery at 1.50c. to 1.55c. and steel bands at 1.45c. to 1.50c., on contracts, the latter carrying half extras as per the steel bar card. We are advised that 1.50c. on steel hoops and 1.45c. on steel bands are absolute minimum of the market, a good many contracts being on the books of the mills at these prices.

Spelter.—The market continues dull and weak, prime grades of Western being offered as low as 4.90c., East St. Louis, equal to 5.02½c., Pittsburgh.

Spikes.—No important orders for railroad spikes are being placed with local makers, the demand being entirely for small lots for repair work. Boat spikes and small rail-

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road spikes are showing a more active demand. We quote standard sizes of railroad spikes, 4½ x 9-16 in. and larger, at 1.55c. to 1.60c. for Western shipment and 1.60c. to 1.65c. for local trade. Boat and small railroad spikes are lower in price and we quote these at 1.65c. to 1.70c., base, these prices being for carload and larger lots.

Rivets.—Current orders are mostly in small lots to meet actual needs. Buying has been light for some time. A few of the smaller makers continue to shade regular prices, which are 2.15c. for structural rivets and 2.25c. for boiler rivets, f.o.b. Pittsburgh.

Shafting.—The new demand for shafting is fairly active, but is not so heavy as some time ago. Specifications against contracts are coming in at a fairly satisfactory rate, and makers are now catching up on deliveries on which they have been behind for some time. Regular discounts on shafting are 55 per cent. off in carload and larger lots and 50 per cent. off in small lots, delivered in base territory. For desirable specifications the carload price of 55 per cent. off is sometimes shaded to the extent of about 55 and 5 off.

Wire Products.—Conditions in the wire trade are far from satisfactory. Orders are light and only to meet current needs. While specifications against contracts were a little heavier in June than in May, it is admitted that the wire trade this year so far has been a disappointment. The American Steel & Wire Company closed down some of its mills on June 30 for inventory and repairs, while the open hearth steel plant, rod and wire mills of the Pittsburgh Steel Company are also closed for inventory and will be idle for two or three weeks. We quote wire nails at $1.80 in carload and larger lots; galvanized barb wire, $2.10; painted, $1.80; annealed fence wire, $1.60; galvanized, $1.90; cut nails, $1.75 to $1.80, all f.o.b. cars, Pittsburgh, with usual terms, and freight to destination added.

Merchant Pipe.—A leading gas interest is reported to be in the market for 100 to 150 miles of 16 to 20 in. pipe. On the lap weld sizes of pipe, used largely for oil and gas lines, the mills are pretty well filled for the remainder of this year, but have few orders on their books for the butt weld sizes, the demand for which has been dull practically all of this year. Discounts on iron and steel pipe are reported as being fairly well maintained.

Boiler Tubes.—Local makers have recently taken several nice contracts for locomotive tubes. The demand for merchant tubes is fair, but is not as large as the mills would like to have it. Regular discounts on locomotive and boiler tubes, printed on a previous page, continue to be more or less shaded.

Coke.—The output in the Upper and Lower Connellsville regions last week showed a falling off of about 11,000 tons as compared with the previous week, and shipments were about 1000 cars less. The market continues quiet, but several large inquiries for foundry coke are out. The Westinghouse Electric & Mfg. Company is reported in the market for upward of 12,000 tons of foundry coke for last half shipment. We quote best grades of furnace coke running under 1 per cent. in sulphur for delivery over last half of the year at $1.80 to $1.85, and best grades of 72-hour foundry coke at $2.15 up to $2.40 per net ton at oven for same delivery. Furnace coke loaded on cars which has to be moved is being offered at $1.65 to $1.70 for best grades.

Iron and Steel Scrap.—Many consumers of scrap closed their plants down June 30 for inventory and repairs, and will not take in any material for some little time. The Pittsburgh Steel Company, Monessen, Pa., which is the largest local consumer of heavy steel scrap, has shut off shipments of scrap until its operations are resumed. Very low prices were bid on the New York Central list, which closed June 28, and also on the list of the Pennsylvania Lines West, which closed June 30, and as a result but little was secured by local dealers. The scrap trade is likely to continue very quiet through July and possibly next month. Dealers quote about as follows, per gross ton, for delivery at Pittsburgh or elsewhere as noted:

Heavy steel scrap, Steubenville, Follansbee, Sharon, Monessen and Pittsburgh delivery	$15.00 to $15.25
No. 1 foundry cast	14.25 to 14.50
No. 2 foundry cast	13.25 to 13.50
Bundled sheet scrap, at point of shipment	10.50 to 10.75
Rerolling rails, Newark and Cambridge, Ohio, and Cumberland, Md.	16.00 to 16.25
No. 1 railroad malleable scrap	14.00 to 14.25
Grate bars	11.00 to 11.25
Low phosphorus melting stock	18.00 to 18.50
Iron car axles	25.00 to 25.25
Steel car axles	21.00 to 21.25
Locomotive axles	26.00 to 26.25
No. 1 busheling scrap	13.00 to 13.25
No. 2 busheling scrap	9.00 to 9.25
Old car wheels	14.50 to 14.75
Sheet bar crop ends, shipping point	16.75 to 17.00
Cast iron borings	8.25 to 8.50
Machine shop turnings	9.50 to 9.75

Chicago

FISHER BUILDING, July 6, 1910.—(*By Telegraph.*)

The custom among manufacturing interests to shut down for inventories and repairs makes the first half of July a very dull period in the market for materials, and it may be several weeks before it is possible to get a definite line on fall trade. The steel mills are an exception to this general closing down, as they have enough business booked to carry them through the summer. The rail mills, in fact, are not able to make deliveries as fast as the railroads desire them, and this is also true of track fastenings and track supplies. The demand for soft steel bars has been so heavy for more than a year that the mills are barely able to clean up old specifications in time to begin on new yearly contracts on which specifications are now coming in. The structural and plate mills are not so well booked, but new structural contracts are coming forward steadily and the railroads are expected to place liberal car orders within the next 60 days. A favorable indication of general business conditions is that the demand from store for plain material is almost as good as it was last winter, and keeps up at a surprising rate. The mills are doing so much better now on deliveries that a general dropping off was expected in sales from store. The buying from stock is not from manufacturers in distress, who were looking last winter for all the material they could get, but is of a general and satisfactory character, and shows that small industries and the smaller building projects are going forward at a normal rate of business. The bar iron market feels the lack of railroad buying and the scrap market is very dull. Trading in metals is limited to prompt deliveries.

Pig Iron.—There is more willingness on the part of Southern furnace interests to sell at $11.50, Birmingham, for last half, and a fair amount has been done the past week at this figure by one of the leading interests which has been holding at $12 until a few days ago. Buyers, however, are showing little interest in the market, and there is no general movement to cover beyond the third quarter. The business pending is principally old inquiries. Many buyers are taking inventory, and their foundries will be closed for a week or more during July, making this the dullest point of the year in actual consumption. Another deterring influence is that the corn belt has gone for more than a month without rain, and while crops have not suffered, there is a tendency in many industries to wait for rains and improvements in business before making deferred purchases. While more of the Southern interests are willing to do $11.50 for the last half of the year than there were a week ago, there are not enough inquiries for spot iron to develop any concessions in this market for prompt or third quarter iron. In Northern grades there is practically no change in the situation. A malleable interest has purchased 3000 tons for the last half for delivery at St. Charles, Ill., and it is understood that the price was not materially lower than the furnace basis which is quoted for Chicago delivery. The local interests seem to be holding firm at prices which net about $16.25 to $16.75, at furnace. With Chicago switching charges added, this is equal to the price which has been quoted in this market for some time. There are scattering inquiries for low phosphorus iron, one from a Milwaukee stove foundry being for 600 tons. The Thomas Furnace at Milwaukee will blow out in a few days for repairs and improvements. The following quotations are for July, August and September shipments, Chicago delivery:

Lake Superior charcoal	$18.50 to $19.00
Northern coke foundry, No. 1	17.25 to 17.75
Northern coke foundry, No. 2	16.75 to 17.25
Northern coke foundry, No. 3	16.25 to 16.75
Northern Scotch, No. 1	17.75 to 18.25
Southern coke, No. 1	16.35 to 16.85
Southern coke, No. 2	15.85 to 16.35
Southern coke, No. 3	15.60 to 16.10
Southern coke, No. 4	15.35 to 15.85
Southern coke, No. 1 soft	16.35 to 16.85
Southern coke, No. 2 soft	15.85 to 16.35
Southern gray forge	15.10 to 15.60
Southern mottled	14.85 to 15.35
Malleable Bessemer	16.75 to 17.25
Standard Bessemer	18.40 to 18.90
Jackson Co. and Kentucky silvery, 6%	19.40 to 19.90
Jackson Co. and Kentucky silvery, 8%	20.40 to 20.90
Jackson Co. and Kentucky silvery, 10%	21.40 to 21.90

(*By Mail.*)

Billets.—No important inquiries have been reported in this market for some time and Pittsburgh quotations govern.

Rails and Track Supplies.—Chicago mills are well covered with specifications for rails and track supplies and not much interest is expected to develop in this market until the railroads begin contracting for 1911. We quote standard railroad spikes at 1.75c. to 1.85c., base; track bolts with square nuts, 2.40c. to 2.50c., base, all in carloads, Chicago. Light rails, 40 to 45 lb., $27; 30 to 35 lb., $27.75; 16, 20 and 25 lb., $28; 12 lb., $29, Chicago.

Structural Material.—A fair amount of business was

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let in the West last week and other good jobs are pending. The Y. M. C. A. Building at Gary, Ind., 440 tons, was let to Vierling, McDowell & Co., Chicago. The Adams School, San Francisco, 415 tons, went to the Ralston Iron Works of that city. The Daniels & Fisher Building at Denver, Colo., 1000 tons, was taken by J. L. Patterson of that city. The general contract for the Jefferson Hotel at Peoria, Ill., has been let, but the plans for the steel work will be revised. The original plans called for 1000 tons. The steel work of the Halsted Street State Bank in Chicago, 485 tons, has been let to George W. Jackson, Inc. The American Bridge Company booked 150 tons for the plate and forge shop of the Minnesota Steel Company at Duluth and 500 tons of axles for the Pullman Company, Chicago. Bethlehem shapes have been specified on two jobs which are pending, the Bankers' Insurance Building at Lincoln, Neb., 215 tons, and a warehouse in Chicago for Marshall Field & Co., which will require 2000 to 3000 tons. Plain material from mill is quoted $1 lower in this market following the reduction last week in Pittsburgh. We quote plain material from mill, 1.63c. to 1.68c., Chicago; from store, 1.90c. to 2c., Chicago.

Plates.—The local mill of the leading interest continues to receive good specifications for steel cars, growing out of the car orders that were placed by the railroads during May. New business from other sources, however, is quiet, and competition in the Pittsburgh district has made prices $1 a ton lower. We quote mill prices at 1.63c. to 1.73c., Chicago; store prices, 1.90c. to 2c., Chicago.

Sheets.—The sheet market is moving along slowly, with the usual concessions from the Eastern mills on black and galvanized sheets and on corrugated roofing. A steady trade is expected during the summer and fall, as there has been a general shortage of tinners through the West, so that the people who do roofing and tin shop business have not been able to take care of their trade. The men available, however, will be kept at work steadily, thus insuring a good jobbing trade for the mills. We quote as follows, Chicago: No. 10 annealed, 1.93c.; No. 28 black, 2.58c.; No. 28 galvanized, 3.68c. Prices from store, Chicago, are: No. 10 blue annealed, 2.25c. to 2.35c.; No. 28 black, 3c. to 3.10c.; No. 28 galvanized, 4c. to 4.10c.

Bars.—The implement manufacturers and other yearly buyers of bars have been giving liberal specifications the past month on their contracts. A year ago many of them had allowed their warehouse stocks to run down, so as to show low inventories July 1, and many of them did not give full specifications until late in the summer and fall. Practically all of them, however, ran short during the winter and spring, with most annoying results. This year it seems to be their policy to accumulate good stocks in their warehouses before beginning their manufacturing season, and in many cases the mills have enough specifications to run them comfortably for six months, leaving very little capacity open to take care of current new business. The bar iron mills, however, have but little business on their books, and outside mills are offering concessions on prompt business, placing iron bars at a considerable discount under soft steel bars. The hard steel bar mills are doing better and have a fair amount of business in sight. Subject to the usual delay in delivery of soft steel bars, we quote as follows: Soft steel bars, 1.63c. to 1.68c.; bar iron, 1.40c. to 1.45c.; hard steel bars rolled from old rails, 1.50c. to 1.60c., all Chicago.

Merchant Steel.—The mills continue backward on deliveries of cold rolled shafting, smooth finished machinery steel and other lines for which there has been an unusual demand this year. The inquiry for tool steel is also active and a good business is being done from store in miscellaneous lots of bars, sheets, structural and other material on which buyers want spot or prompt delivery. Manufacturers are generally showing a tendency to buy for near delivery, except the larger interests, which make yearly contracts direct with the mills.

Rods and Wire.—July is the dullest season of the year in the wire business and the first half of July is generally very quiet, as it coincides with harvest time. The mills, however, are getting a fair run of business and conditions are considered very favorable for fall trade. There are no expectations of bumper crops of wheat or corn, but fair crops usually bring the farmers better returns by realizing higher prices. A great deal of fence building on the farm has been postponed until fall on account of weather conditions which have kept the farmers busy in the field. Jobbers' carload prices, which are quoted to manufacturing buyers, are as follows: Plain wire, No. 9 and coarser, base, 1.78c.; wire nails, 1.98c.; painted barb wire, 1.98c.; galvanized, 2.28c., all Chicago.

Cast Iron Pipe.—Municipal legislative bodies generally adjourn for the summer months throughout the West, and no large lettings are expected in the water pipe trade for some time. The leading pipe interest has booked a letting at West Allis, Wis., for about 300 tons of water pipe, and there is a fair run of small lettings and orders from minor municipalities. On current business we quote, per net ton, Chicago, as follows: Water pipe, 4-in., $28; 6 to 12 in., $27; 16-in. and up, $26, with $1 extra for gas pipe.

Old Material.—Railroad malleable scrap continues the weakest feature of the market, as the large foundries appear to be entirely indifferent to the bargains that are offered them. A Western railroad offered a lot of 1500 tons at private sale last week at $11.50, but was unable to make a sale, although nearly every dealer in town had an opportunity to take the material. Other grades of scrap are holding fairly steady, as prices are so low now that a buyer can generally be found for any material that has to be placed. Cast scrap is a little weaker, in sympathy with pig iron, and, perhaps, due also to the fact that foundries melt less in July and August. The only profit for the scrap dealer is on the short side of the market, a condition that has prevailed for the past nine months. Where the dealer makes a sale to the consumer before he buys the material to cover it he has come out ahead, but if he buys before he has the customer lined up he loses. The railroads have offered an unusual amount of scrap during the past 60 days, as they were tied up by the coal strike until late in the spring and were unable then to move their material. This scrap is beginning to come in now, but it does not exert much pressure on the market, as the dealers have sold practically all of it as they went along on contracts with consumers. Market conditions are such that dealers do not show any confidence in expecting higher values. They are not laying down scrap in their yards at present prices, although values are below the average of last year. Scrap men watch the stock market and financial conditions closely and as a rule they have been trading cautiously and doing a brokerage business for the past six months. If there should be an unusual demand next fall from mill consumers and foundries there will be very little in the way of reserve stock in dealers' yards to meet it. In many cases the prices quoted in this market are nominal, as there are no sales to consumers to fix a definite level. This is true, for example, of old car wheels, on which no sales to foundries have been reported for a long time. The best bid received last week by a railroad, which offered 500 tons, was equal to about $15 for Chicago delivery, but the wheels were not sold. Following prices are per gross ton, delivered, Chicago:

Old iron rails	$17.00 to $17.50
Old steel rails, rerolling	16.00 to 16.50
Old steel rails, less than 3 ft	13.50 to 14.00
Relaying rails, standard sections, subject to inspection	24.00 to 25.00
Old car wheels	15.00 to 15.50
Heavy melting steel scrap	12.75 to 13.25
Frogs, switches and guards, cut apart	12.75 to 13.25
Shoveling steel	12.25 to 12.75

The following quotations are per net ton:

Iron angles and splice bars	$15.00 to $15.50
Iron car axles	20.00 to 20.50
Steel car axles	20.00 to 20.50
No. 1 railroad wrought	12.75 to 13.25
No. 2 railroad wrought	11.75 to 12.25
Springs, knuckles and couplers	12.00 to 12.50
Locomotive tires, smooth	17.00 to 17.50
No. 1 dealers' forge	11.00 to 11.50
Steel axle turnings	9.00 to 9.50
Machine shop turnings	7.75 to 8.25
Cast and mixed borings	5.00 to 5.50
No. 1 busheling	10.50 to 11.00
No. 2 busheling	8.00 to 8.50
No. 1 boilers, cut to sheets and rings	9.50 to 10.00
No. 1 cast scrap	13.00 to 13.50
Stove plate and light cast scrap	11.00 to 11.50
Railroad malleable	11.50 to 12.00
Agricultural malleable	11.00 to 11.50
Pipes and flues	9.50 to 10.00

Philadelphia

PHILADELPHIA, PA., July 5, 1910.

There has been a customary slowing down in business, due to the holiday period, as well as the closing of plants for usual midsummer repairs and stock taking. In some few cases mills will undergo more extensive repairs and the period of idleness slightly prolonged; in others, however, stoppages have been quite brief. Orders and inquiries were lighter during the latter part of last week, but in quite a number of instances mills started out this week with a very satisfactory volume of business. Nothing of any great importance has developed in the pig iron markets, and prices are unchanged at recent quotations. There has been a fair business in steel plates, and a trifle better quantity of work in structural material is being offered. Prices for plates and shapes are, however, not particularly strong. The other lines of finished materials continue dull. Old material remains inactive. The demand for coke has been brisker, quite a few contracts for foundry coke for second half shipment being closed.

Pig Iron.—Some little business in foundry irons continues to be done, although the market exhibits the usual

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characteristics of the season. Sales of No. 2 plain foundry have been more freely made, several 500-ton lots being taken by consumers at prices ranging from $16 to $16.25, delivered. No. 2 X foundry is selling in small lots at $16.25 to $16.75, delivered, the inside price being the minimum open quotation for standard brands, and not all producers will meet that figure, which, it is contended, is under their cost of production. Cast iron pipe foundries have been buying moderate lots of low grade iron for early delivery, purchases during the week aggregating several thousand tons. Several fair sized blocks of foundry iron are still before the trade, while fresh inquiries recently have been mostly for small quantities. Melters continue to feel round pretty thoroughly before placing their orders. The demand for forge iron for mill purposes continues dull, but prices are nominally unchanged. There has been a moderate movement in Virginia foundry irons. The minimum price for No. 2 X is held by the majority of producers at $13.75, furnace, for third quarter shipment, although $14 is obtained for some brands; one unimportant interest is said to be willing to make a slight concession for prompt iron. Recent sales have practically all been for small lots. The demand for steel making grades of iron is less marked; some little business in low phosphorus iron has been done at unchanged prices. Basic iron is quieter. On the recent buying movement from 40,000 to 45,000 tons was taken, and the interests buying are now out of the market. One or more melters in this district are, however, believed likely to come into the market for third quarter iron. The situation generally appears to have a little better tone, although there are still several weak sellers in the market. A number of the producers claim that they cannot meet the present low quotations, and they would rather further curtail production than sell at quoted minimum prices. The following range about represents the market for standard brands delivered in buyers' yards in this vicinity:

Eastern Pennsylvania, No. 2 X foundry	$16.25 to $16.75
Eastern Pennsylvania, No. 2 plain	16.00 to 16.25
Virginia, No. 2 X foundry	16.50 to 17.00
Virginia, No. 2 plain	16.25 to 16.75
Gray forge	15.50 to 15.75
Basic	15.75
Standard low phosphorus	22.75 to 23.00

Ferromanganese.—No inquiry from consumers in this territory is reported, although sellers still note some demand from Western buyers. Quotations are nominal, at $39.50 to $40, Baltimore, for 80 per cent., but on desirable lots could probably be slightly shaded.

Billets.—Very little business is being offered, inquiries being usually for small prompt lots. Mills in this vicinity are shut down for repairs, which in some instances will be quite extensive. Prices are unchanged and a shade stronger, at $28.50 to $29 for ordinary rolling billets, delivered in this vicinity. Forging billets are firm at $31 to $32, Eastern mill, the usual extras applying for high carbon and special sizes.

Plates.—Mills report a very satisfactory run of business since the first of the month. Orders for the most part are small, but there have been a few fair-sized lots placed. The shut down at the mills will not be prolonged. Prices are still inclined toward weakness, as many of the mills are anxious for business. Desirable tonnages can be placed at 1.60c., delivered here, although 1.65c., delivered, about represents the market for orders of an ordinary character.

Structural Material.—A better volume of building work is before the trade. The individual tonnage is in no particular instance very large, but in the aggregate represents a fair total. More railroad bridge work has come out, the Western Maryland Railroad, it is understood, having placed considerable business for a proposed extension of its road. A good volume of miscellaneous business is coming to the mills, which maintain about an average production. Prices show no change, but are weak at 1.60c. to 1.65c. for plain shapes, delivered in this vicinity.

Sheets.—The demand has been fair, although current business has been interrupted by the holiday. Mills are accumulating orders, owing to the usual midsummer suspension of plants. Prices are a shade stronger, the following range representing the market for business of an ordinary character: Nos. 18 to 20, 2.80c.; Nos. 22 to 24, 2.90c.; Nos. 25 and 26, 3c.; No. 27, 3.10c.; No. 28, 3.20c.

Bars.—Business remains quiet. Some small orders are being placed, but little real interest is shown in the market. Refined iron bars are being pretty firmly held at 1.47½c. to 1.55c., delivered in this territory, with steel bars strong at 1.60c., delivered.

Coke.—Business in foundry coke has been more active, but the demand for furnace coke is quiet. Quite a few contracts for supplies of foundry coke, delivery over the last half of the year, have been made at $2.25 to $2.50, per net ton, at oven. Spot foundry coke has been sold, however, down to $2.10. Furnace coke is weak at $1.65 to $1.85, at oven. The following range of prices, per net ton, about represents the market for last half, delivered in this territory:

Connellsville furnace coke	$4.00 to $4.15
Foundry coke	4.50 to 4.75
Mountain furnace coke	3.60 to 3.75
Foundry coke	4.10 to 4.35

Old Material.—Inactivity is to be noted in practically all grades. Pending awards against railroad lists now before the trade and which represent about the average quantity the trade is marking time. Very few sales are reported, and those made are usually for small lots. There has been no movement in heavy melting steel and prices are unchanged; wrought scrap, however, is, if anything, weaker. The following prices named for delivery in buyers' yards in this vicinity are to a large extent nominal:

No. 1 steel scrap and crops	$14.25 to $14.50
Old steel rails, rerolling	16.00 to 16.50
Low phosphorus	19.50 to 20.00
Old steel axles	20.50 to 21.00
Old iron axles	26.50 to 27.50
Old iron rails	19.00 to 19.50
Old car wheels	14.50 to 15.50
No. 1 railroad wrought	16.00 to 16.50
Wrought iron pipe	14.50 to 15.00
No. 1 forge fire	12.50 to 13.00
No. 2 light iron	8.50 to 9.00
Wrought turnings	9.75 to 10.25
Cast borings	9.50 to 9.75
Machinery cast	15.00 to 15.50
Railroad malleable	14.50 to 15.00
Grate bars	12.50 to 13.00
Stove plate	10.00 to 10.50

Cincinnati

CINCINNATI, OHIO, July 6, 1910.—(*By Telegraph.*)

The price situation remains much the same in both crude and finished material, notwithstanding the efforts of consumers to turn the tide their way. Some large users of pig iron are apparently making their last stand for lower prices this week. The scrap situation shows extreme weakness.

Pig Iron.—A number of tentative inquiries for foundry and special iron which looked promising last week are said to be temporarily abandoned. Southern furnacemen show, if anything, a more aggressive front and consumers seem to be gradually abandoning the hope of $11 iron for this year. The real test of both Southern and Northern markets should develop to-morrow, when representatives of every furnace interest in both sections will compete for the 2400 tons needed by a large central Ohio interest. A local furnace is expected to take the Northern business, for a delivered price of $15.75 would net the furnace $15.50, and about the best that Ironton interests could do would be $16, delivered. Malleable is still held at $15.50, Ironton, and there is a little inquiry for ferrosilicon, which is quotable at $23 for 10 per cent., with a spread of $1 between per cent. units. Low grades of pig iron are reported to be scarce again, with some inquiry from the pipe companies. A manufacturer of agricultural implements in northern Indiana has out an offer for a considerable tonnage of iron at a figure about 50 cents below the market. The south central Ohio manufacturer wanting 1000 tons of Nos. 2 and 4 foundry has withdrawn the inquiry for the present. One large Southern interest which has hitherto been willing to sell to the close of third quarter at $11.50, Birmingham, quotes $12 on 1200 tons up for award to-morrow as its minimum, and another large interest in the same district has made $12 its minimum also for fourth quarter business. For immediate delivery and through the last half, based on freight rates of $3.25 from Birmingham and $1.20 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 foundry	$15.25 to $15.75
Southern coke, No. 2 foundry	14.75 to 15.25
Southern coke, No. 3 foundry	14.50 to 14.75
Southern coke, No. 4 foundry	14.25 to 14.50
Southern coke, No. 1 soft	15.25 to 15.75
Southern coke, No. 2 soft	14.75 to 15.25
Southern gray forge	14.00 to 14.25
Ohio silvery, 8 per cent. silicon	19.20
Lake Superior coke, No. 1	16.70
Lake Superior coke, No. 2	16.20
Lake Superior coke, No. 3	15.70
Standard Southern car wheel	25.25 to 25.75
Lake Southern car wheel	22.25 to 22.75

(*By Mail.*)

Coke.—Reports from the larger producing districts indicate that operators are not encouraging long time contracts from furnacemen at present levels. There are some fairly good contracts in negotiation for foundry coke, but as a rule the average jobbing establishment is buying from hand to mouth. Some prompt delivery furnace coke is going as low as $1.65 per net ton, at oven, and from $1.75 to $1.85 rules on contract for the second half. Pocahontas furnace grades are quotable at $1.85 on contract and for spot lots from 5c. to 10c. lower, according to ruling conditions. Connellsville foundry coke on contract is selling at $2.25 to $2.50, Pocahontas foundry about $2.15 to $2.25, Wise County

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foundry about $2.25, with some going as low as $2 for spot and early delivery.

Finished Iron and Steel.—Warehousing and jobbing interests continue to report business excellent, and there was no appreciable let up in buying on account of the national holiday. Structural material, except plates, is on a 1.50c., Pittsburgh, basis, and out of stock, 1.90c.; plates are quotable at 1.45c., Pittsburgh. Steel bars are quotable also at 1.45c., Pittsburgh, and the month of June proved the best of the year on sizes popular with the agricultural implement makers. Iron bars are weak, and 1.50c., Cincinnati mill, is easily done. Anticipating a great volume of concrete construction, business on twisted steel bars is excellent, and promises to be considerably larger. A number of important improvements will be made in the mills of the Newport Rolling Mill Company, which are shut down this month for the annual overhauling. The large improvements in progress at the plant of the American Rolling Mill Company in Middletown, Ohio, are rapidly approaching completion, and beginning with the new year the output of the plant will be materially increased.

Old Material.—There is no change in market conditions on scrap and dealers are all anticipating an extremely dull month. Shipments are delayed on account of the July shutdown, and some interests seem anxious to cancel. Dealers are still buying, but at very low levels, and railroad offerings have been fairly well taken by local establishments. Relayers are still fairly active. For delivery in buyers' yards, Cincinnati and southern Ohio, we quote nominal prices, as follows:

No. 1 railroad wrought, net ton	$11.50 to $12.00
Cast borings, net ton	4.00 to 5.00
Heavy melting steel scrap, gross ton	11.50 to 12.00
Steel turnings, net ton	6.00 to 7.00
No. 1 cast scrap, net ton	11.00 to 12.00
Burnt scrap, net ton	8.00 to 9.00
Old iron axles, net ton	16.50 to 17.00
Old iron rails, gross ton	17.00 to 17.50
Old steel rails, short, gross ton	14.50 to 15.50
Old steel rails, long, gross ton	14.50 to 15.50
Relaying rails, 56 lb. and up, gross ton	22.00 to 23.00
Old car wheels, gross ton	12.00 to 13.00
Low phosphorus scrap, gross ton	16.00 to 16.50

Cleveland

CLEVELAND, OHIO, July 5, 1910.

Iron Ore.—That the movement down the lakes during June exceeded 7,000,000 tons is indicated by incomplete reports of shipments received from upper lake docks. This is a considerable gain over May, when the shipments were 6,081,335 tons. Owing to the fact that about 20 per cent. of the independent vessel tonnage has been taken out of commission, and few merchant furnaces want to take their ore, it is expected that the July shipments will show a falling off. No sales are reported. We quote prices as follows, per gross ton: Old Range Bessemer, $5; Mesaba Bessemer, $4.75; Old Range non-Bessemer, $4.20; Mesaba non-Bessemer, $4.

Pig Iron.—While the market in this territory is rather quiet, several sales of foundry iron were made during the week in lots of 500 tons and under. A number of inquiries are also pending for small lots. One local foundry that had an inquiry out for 1000 tons or more has decided not to buy for the present. Two other local foundries that use considerable tonnage are feeling the market on prices for the first half of next year. An inquiry from western Pennsylvania is for 1000 tons of No. 2 foundry for spot shipment. While less active than two or three weeks ago, considerable tonnage of foundry and malleable iron was sold during the week to Michigan and Indiana consumers. Some contracts for both foundry and malleable iron have been made for the first quarter and first half of next year. Furnaces willing to sell for delivery beyond January 1 are asking about 50 cents a ton above last half prices for that delivery. Some contracts are being made, however, for delivery extending through one or two months of next year at last half prices, buyers attempting to secure as extended deliveries as possible on such terms. For last half delivery No. 2 foundry is generally quoted at $14.50, Valley furnace, for the last half, but one or two interests are understood to be shading this to $14.25. There is an improvement in the demand for Ohio silvery iron. The price of $18 for 8 per cent. is being shaded for third quarter delivery. Southern iron is fairly firm at $11.50, Birmingham, for No. 2 for the third quarter and $12 for the fourth quarter. For prompt shipment and for the last half we quote, delivered Cleveland, as follows:

Bessemer	$16.65
Northern foundry, No. 1	$15.75 to 15.90
Northern foundry, No. 2	15.25 to 15.40
Northern foundry, No. 3	14.75 to 14.90
Gray forge	14.65 to 14.90
Southern foundry, No. 2	15.85 to 16.35
Jackson Co. silvery, 8 per cent. silicon	19.50

Coke.—Some additional foundry coke contracts have been placed for the last half and a few running through an entire year at last half prices. Some producers are unwilling to sell beyond January 1. A local interest has contracted for its furnace coke requirements for July. We quote standard Connellsville furnace coke at $1.60 to $1.70 per net ton, at oven, for spot shipment and $1.80 to $1.85 for the last half. Connellsville 72-hour foundry coke is held at $2.15 to $2.25 for spot shipment and $2.25 to $2.50 for the last half.

Finished Iron and Steel.—With the exception of a few orders for round lots for specific work, not much new business came out during the week. Many consumers are taking inventories and specifications have been rather light, except for steel bars. Orders for a considerable tonnage of bars were received on contracts that expire July 1. The Carnegie Steel Company has received a contract for 2500 tons of structural shapes and plates from the Toledo Shipbuilding Company for a car ferry, the contract for which has just been placed by the Ann Arbor Railroad. The Wheeling & Lake Erie Railroad has placed contracts for 2300 tons of ferrotitanium rails, the Carnegie Steel Company getting 1150 tons and joints for the entire tonnage and the Lackawanna Steel Company getting 1150 tons. The contract for the new plant to be erected by the National Carbon Company at Niagara Falls has been let to T. H. Brooks & Co., Cleveland. The main building will require 1000 tons, but other buildings proposed will probably increase this to about 1500 tons. Bids will be received this week for the Cleveland Athletic Club Building, requiring 1000 tons, and proposals will be asked for shortly for a new building for the Cleveland Telephone Company that will take 800 tons. Considerable other structural work is in prospect in this city that will require 400 tons and under. We quote plain material at 1.45c., Pittsburgh. The demand for plates is rather light. Mill agencies are getting 1.50c., Pittsburgh, for small lots, but on desirable orders some mills are shading the usual price of 1.45c., Pittsburgh. The demand for sheets continues light and prices are weak and irregular. Many of the smaller mills are eager for tonnage, and black sheets are being shaded $3 a ton and galvanized $4. Steel bars are firm at 1.45c., Pittsburgh. The demand for iron bars continues light and prices are stationary at 1.40c. to 1.45c., at mill. The two local bar iron mills shut down June 30. When they will start up again will depend on the demand. Business with jobbers continues fairly good.

Old Material.—With some mills shut down and others holding back on shipments, there is practically nothing doing in the scrap market. Prices are weak, but owing to an absence of transactions quotations, which have not been changed, are largely nominal. While some demand will follow the resumption by the mills dealers do not look for much activity before fall. The Erie Railroad closed July 5 on its usual tonnage. Dealers' prices per gross ton, f.o.b. Cleveland, are as follows:

Old steel rails	$14.50 to $15.00
Old iron rails	16.50 to 17.00
Steel car axles	21.00 to 21.50
Heavy melting steel	13.25 to 13.50
Old car wheels	14.00 to 14.50
Relaying rails, 50 lb. and over	22.50 to 23.50
Agricultural malleable	12.00 to 12.50
Railroad malleable	13.50 to 14.00
Light bundled sheet scrap	9.75 to 10.25

The following prices are per net ton, f.o.b. Cleveland:

Iron car axles	$21.50 to $22.00
Cast borings	6.00 to 6.50
Iron and steel turnings and drillings	7.00 to 7.50
Steel axle turnings	9.50 to 10.00
No. 1 busheling	12.00 to 12.50
No. 1 railroad wrought	14.00 to 14.50
No. 1 cast	12.50 to 13.00
Stove plate	11.00 to 11.50
Bundled tin scrap	11.00 to 11.50

Birmingham

BIRMINGHAM, ALA., July 4, 1910.

Pig Iron.—Much is heard of $11.50 iron for delivery anywhere from prompt through the entire remainder of the year, yet it is an exceedingly hard matter to trace the source of such information and to find the furnace interests willing to admit of having made such quotations and sales. However, while two or three say that they are selling iron on the basis of $11.50, others say that $12 is their best price. The actual tonnage of iron sold the past week was not as large as the week previous. One lot of 3000 tons was sold at $11.50 for third quarter delivery. The Holt furnace of the Central Coal & Iron Company has gone out of commission, which means a further curtailment of production. The output of the Ironaton furnace of the Alabama Consolidated Coal & Iron Company has been sold for the entire year. This means another stack out, so far as its output figuring in stock conditions. Low grade iron is still very much in demand, and the usual premium is de-

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manded. On the whole, Southern producers are gradually adjusting production to what seems to be the demands of the country along the line of consumption. If it is a fact that production is yet too large, considering the fair tonnage in stock, in all probability steps will be taken to have a still further readjustment of matters. At least, this seems to be the sentiment of producers. Buyers are realizing more forcibly the attractiveness of present prices.

Cast Iron Pipe.—Considering the fact that the pig iron market has been more or less unsettled, it is natural to suppose that the manufacture of finished products directly affected by it would be uncertain to a great extent. Local manufacturers report a continuation of the small bookings, which is considered a very satisfactory business. This, of course, is particularly good for them from the fact that they are enabled to quote from time to time in keeping with the changes in the pig iron market. We quote water pipe as follows, per net ton, f.o.b. cars here: 4 to 6 in., $23; 8 to 12 in., $22; over 12-in., average $21, with $1 per ton extra for gas pipe.

Old Material.—To put it mildly, business in the scrap iron market is practically at a standstill. Owners of mill and factory refuse to sell their accumulations of scrap on account of the exceedingly low prices. Dealers claim they cannot afford to offer anything like attractive prices for same, and users apparently have all they want at present; hence there is a very inactive market. Prices quoted are only nominal and are about as follows, per gross ton, f.o.b. cars here:

Old iron axles	$16.50 to $17.00
Old iron rails	12.50 to 13.00
Old steel axles	16.00 to 16.50
No. 1 railroad wrought	11.50 to 12.00
No. 2 railroad wrought	9.00 to 9.50
No. 1 country wrought	8.50 to 9.00
No. 2 country wrought	8.00 to 8.50
No. 1 machinery	10.00 to 10.50
No. 1 steel	9.00 to 9.50
Tram car wheels	9.50 to 10.00
Standard car wheels	11.00 to 11.50
Light cast and stove plate	7.00 to 7.50

St. Louis

ST. LOUIS, July 4, 1910.

Though, speaking in a general way, the demand for pig iron is dull at present, in the case of some houses reference to their books shows that a quiet satisfactory business has been done for the first half of 1910. One leading house states that its sales to July 1 totaled as much as for the entire period of 1909, and another company states that its shipments exceeded the same time last year, though a part were 1909 contracts. Bankers report a shrinkage of nearly $15,000,000 in deposits in the past three months and an increase in loans of $10,000,000, indicating that business enterprises are expanding in this section.

Coke.—The demand for foundry coke keeps up well, though for the most part it is coming from medium to small buyers; consequently the total tonnage is not large. One office, however, last week closed a contract for 1000 tons of Indianapolis by-product coke for shipment over a year and another house reported a sale of 2500 tons of standard Connellsville for the same delivery. Large contracts are based on $2.25 per net ton f.o.b. Connellsville, while smaller transactions are done at $2.50. There is hardly a sufficiently active demand from large buyers to make a strong market, though previous prices are asked.

Pig Iron.—With most offices the past week was the dullest since New Year's, both with respect to inquiries and sales. The larger houses report some good inquiries and a few sales. Among the inquiries are the following: 2000 tons foundry iron, 1000 tons Southern foundry, 1000 tons malleable, 3000 tons Southern foundry (this inquiry specifies shipment over the first quarter 1911). One leading office reports sales aggregating 1800 tons of Southern foundry, mostly for last half delivery; another seller mentions 600 tons of No. 2 Northern and Southern iron, various deliveries, and 300 tons of No. 1 soft for prompt shipment. A merchant seller secured contracts for 500 tons. With respect to prices, a considerable business is being worked on the basis of $11.50, Birmingham, for No. 2 Southern foundry, for shipment over the last half; this may be considered the market, notwithstanding $12 is asked and offers of less are declined by some furnacemen. Southern Ohio is held at $15, f.o.b. furnace.

Old Material.—It is mainly a dealers' market, with some business passing, and shipments being made on previous contracts. Owing to July usually ruling dull on account of repairs, hot weather and the adjustment of the Amalgamated scale of wages, not much improvement is looked for in the near future. A list of 2500 tons offered by the Missouri Pacific was closed out last week. Prices realized were lower than last month. The tone of the market is tolerably strong in anticipation of a better demand early in the fall, and prices are unchanged from last week. We quote dealers' prices as follows, per gross ton, f.o.b. St. Louis:

Old iron rails	$15.00 to $15.50
Old steel rails, rerolling	13.50 to 14.00
Old steel rails, less than 3 ft	13.50 to 14.00
Relaying rails, standard sections, subject to inspection	25.00 to 25.50
Old car wheels	15.00 to 15.50
Heavy melting steel scrap	12.50 to 13.00
Frogs, switches and guards, cut apart	12.50 to 13.00

The following quotations are per net ton:

Iron fish plates	$14.00 to $14.50
Iron car axles	21.00 to 21.50
Steel car axles	20.00 to 20.50
No. 1 railroad wrought	13.50 to 14.00
No. 2 railroad wrought	12.50 to 13.00
Railway springs	11.50 to 12.00
Locomotive tires, smooth	16.50 to 17.00
No. 1 dealers' forge	11.00 to 11.50
Mixed borings	6.00 to 6.50
No. 1 busheling	11.00 to 11.50
No. 1 boilers, cut to sheets and rings	9.50 to 10.00
No. 1 cast scrap	10.50 to 11.00
Stove plate and light cast scrap	9.50 to 10.00
Railroad malleable	10.50 to 11.00
Agricultural malleable	10.00 to 10.50
Pipes and flues	9.50 to 10.00
Railroad sheet and tank scrap	8.50 to 9.00
Railroad grate bars	9.00 to 9.50
Machine shop turnings	8.50 to 9.00

The Amilie Mfg. Company, East St. Louis, Ill., has been incorporated; capital stock, $100,000; incorporators, Sigvald C. Amilie, Eleanor P. Amilie, W. Sherwood Doyle, to engage in general manufacturing.

The Garver Tracklaying Machine Company, Urbana, Ill., has been incorporated; capital stock, $30,000; incorporators, Taylor M. Garver, Oliver W. Lamb and Harvey M. Grant.

William Yule of the DeCamp-Yule Coal, Coke & Iron Company returned last week from a visit to Texas, where he had been looking after the company's ore and foundry interests.

San Francisco

SAN FRANCISCO, CAL., June 29, 1910.

A general curtailment of business has been apparent for the last month, due largely to the unsettled labor conditions which obtain at most manufacturing centers on the Pacific Coast. In most departments the movement is entirely of a distributive nature, the tonnage booked by mill interests being very light. The demand in southern California has been checked by the strike in the Los Angeles metal trades. In San Francisco and at other points where no strike has been declared purchases are made in a small way for the most pressing requirements, but the uncertain outlook still causes hesitation in regard to placing large orders. Estimates as to the probable requirements of the next year have not been reduced, however, and the present curtailment is considered temporary, as the situation aside from labor conditions is favorable. Structural activity in San Francisco and the interior shows a slight revival, and there is a fair inquiry for bars. A moderate tonnage of rails has been booked and several new inquiries are coming into the market. Old material is quiet, with a tendency to weakness in some lines.

Bars.—The jobbing movement is well maintained, but the large tonnage in store here is sufficient for most current requirements. While there is a steady inquiry for reinforcing material, orders from the manufacturing interests are of moderate volume and mostly for immediate needs. Jobbers continue to order from foreign mills for next year's supply, but the tonnage booked by domestic mills has not been appreciably reduced since last month. Bars from store, San Francisco, are quoted at 2.50c. for steel and 2.30c. for iron.

Plates.—The recent heavy demand for plates has been largely due to the construction of oil storage tanks, riveted pipe, &c., the principal tonnage being handled at Los Angeles. Following the strike in that city there has been a marked reduction in the demand, the curtailment extending to heavy sheets used in pipe work. Deferred delivery has been asked on a number of orders and some cancellations are reported, as much of the construction work for the oil fields is delayed indefinitely. A resumption of activity on the adjustment of present difficulties is assured, as the necessity for completing the work in hand is urgent. The demand in other quarters continues strong, with several new inquiries for gas tank construction in San Francisco and interior towns. The San Francisco Gas & Electric Company has ordered material amounting to over 2000 tons for a new gas holder from a Philadelphia firm. The Oro Water, Light & Power Company, Oroville, Cal., is planning a new gas container. Additional storage projects in the oil fields are taking shape, but the outlook in that quarter is uncertain at the moment.

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Rails.—The jobbing movement of light rails remains fairly active and local merchants are in the market to a moderate extent to replenish their stocks. Recent bookings of standard sections have included a few orders of some importance, a purchase having been closed for the Oakland & Antioch line, about 25 miles. A considerable tonnage is also moving in the north. A new project is being promoted for a road through Coalinga, connecting Fresno and Monterey. Plans are being made for a 30-mile lumber road in Butte and Plumas counties, Cal. An extension project of the Hilo Railway, Hawaiian Islands, has been approved by the stockholders.

Structural Material.—Fabricating work continues quiet, though most of the local shops have a little more work on hand than a month ago and the local outlook is better than for some time past. Most jobs are of the same unimportant character as for some time past, contracts for large buildings coming out very slowly. Dyer Bros. have taken a contract for about 100 tons for the Pacific Coast Steel Company's new shop at South San Francisco and another small contract for the Gutzeit Building on Mission street. Other local jobs to be let shortly are the Whittell and Dimond estate buildings. The contract for the Los Angeles Athletic Club, Los Angeles, has been delayed on account of labor troubles at that place. Awards have also been delayed on the Solano and Kern county court houses. The Western Pacific car shops at Sacramento, Cal., will require a considerable tonnage, the contract for which is expected in the near future. The Baker Iron Works has taken a small contract for the Pacific Light & Power Company's plant at Redondo, Cal. The steel work for the Nicolaus, Gaven & Southworth Building at Sacramento, Cal., will be given out this week, and a fair tonnage will be required for the Clunie Theatre Building at Sacramento. The San Francisco masonic lodges are considering the erection of another large building, to cost about $600,000. The largest job in prospect is the Oakland City Hall, preliminary plans for which have been accepted. The details have not been worked out, but the building is expected to require about 2500 tons of steel and the contract should be let within the next year. A fair volume of work is expected to result from the appropriation for Government buildings in California, including the sub-treasury at San Francisco and large post offices at Berkeley, Chico and Pasadena, Cal. Beams and Channels, 3 to 15 in., from store, San Francisco, are quoted at 2.70c.

Merchant Pipe.—The tonnage booked in the last month has been as small as for any similar period in the year. The jobbing trade in small pipe is still of small proportions, and appears likely to continue so for some time. Merchants have been unable to effect any material reduction in their holdings, most of which were acquired over six months ago, and there is practically no inquiry for future delivery of such material from the mills. The 1000 tons in transit by sea has not arrived and some anxiety is felt regarding its safety. The oil pipe business, which was the principal feature at the beginning of the quarter, has fallen flat. A few small orders are being placed, but the large business for fall delivery which was anticipated is almost entirely witheld. No direct inquiry has yet been made for the requirements of projected pipe lines, but a few small orders have been received for gas and water systems. The town of Bishop, Cal., is in the market for 1000 ft. of 4-in. pipe.

Cast Iron Pipe.—The tonnage is fairly well sustained, bookings during June being rather above the average, and with a number of new inquiries continued activity is anticipated. There is a good demand for gas pipe, as additions are to be made to the distributing systems in a number of California towns. Plans have been completed for laying the first section of the San Francisco auxiliary water system. Bids will be received in a few days for an 8-in. line between the Presidio and Fort Mason, San Francisco. The town of Lodi, Cal., will open bids July 5 for over 400 tons of pipe and about 60 tons of specials and hydrants. The United States Pipe Company has taken an order for 2000 ft. of 4-in. pipe for Vallejo, Cal. The Pacific Gas & Electric Company, will shortly install a lot of new pipe at Vallejo. The wooden pipe lines of the San Diego Flume Company, supplying water to a number of towns near San Diego, Cal., are to be replaced with iron.

Pig Iron.—It is still difficult to sell pig iron for future delivery and foundries which are not already supplied are confining their purchases to immediate needs. Requirements are not large, though the volume of machinery work is better than a few months ago. Prices show considerable variation, according to the nature and magnitude of the transaction. The amount of domestic iron used here is negligible, Chinese iron being used quite extensively for general work. Importers of Chinese iron are prepared to meet all competition, the price being held at about $23 on small lots, though larger sales are occasionally reported at lower figures.

Old Material.—Cast iron scrap is neglected by melters at present, immediate requirements being provided for by former purchases. A considerable tonnage is coming into the market, but there is no pressure to sell on the part of dealers and prices are well maintained. Steel melting scrap is also piling up, as none has been shipped East for some time and more is offered than the local demand can take care of. The price is largely nominal and some decline is expected. Rerolling rails find a fair demand. Prices are quoted as follows: Cast iron scrap, per gross ton, $17; steel melting scrap, per gross ton, $10; railroad wrought scrap, per net ton, $14; rerolling rails, per net ton, $15.

Buffalo

BUFFALO, N. Y., July 5, 1910.

Pig Iron.—A considerable improvement in the inquiry for small lots in foundry grades and malleable was noted during the latter part of last week, but the sales developing were rather light, the holiday observance interfering with the active routine of business. In basic no sales were reported. Prices are still slack, with no apparent tendency toward an upward turn. Furnacemen as a rule, however, are pursuing a conservative course in the matter of quotations and refusing to meet competition that will bring prices any nearer to the cost line. Reports from melters in territory tributary to this district indicate there will be a steady consumption, at the present heavy rate of shipment from furnaces, right along during the midsummer period. We quote as follows, per gross ton, f.o.b. Buffalo, for prompt shipment and last half:

No. 1 X foundry	$15.50 to $16.00
No. 2 X foundry	15.25 to 15.75
No. 2 plain	15.00 to 15.50
No. 3 foundry	14.75 to 15.25
Gray forge	14.50 to 15.00
Malleable	15.25 to 16.00
Basic	15.25 to 15.75
Charcoal	19.00 to 19.50

Finished Iron and Steel.—The June total of business in finished products for Buffalo territory was very heavy, fully equal to May, and one leading interest reports it the best of any month of the current year in actual tonnage placed on order books. Reports show that most of the contracts expiring July 1 were specified in full, the mills promptly canceling all contracts not completely specified, in accordance with their more recent policy not to extend low-priced contracts. The demand for steel bars continues active, although order placements have been somewhat checked for the week by the holiday suspension of business. The demand for twisted steel bars for concrete work has been large and prices are firm for all bar products. In the Canadian export trade the feeling is optimistic, with large inquiry for shapes and plates. In structural lines the demand is very active, and specifications for a large number of propositions in bridge work, new plant construction and miscellaneous commercial and industrial buildings have come into the market for figuring within the last week. Bids will be closed this week for the addition to the Snow Building, Syracuse, to be used by the Citizens' Club, requiring 150 tons. The Toledo-Massillon Bridge Company, Toledo, was low bidder for the steel for the Niagara Machine & Tool Works' new plant, Buffalo, 700 tons, and the George Kellogg Structural Company received contract for the structural steel, about 300 tons, for the Clinton Street Market Building, Buffalo. The contract for the steel for the plant of the Simonds Mfg. Company, Lockport, N. Y., about 1000 tons, has been awarded to the Kenwood Bridge Company, Chicago. The wage trouble between the Buffalo Union of Structural Iron Workers and the structural steel erectors has been adjusted by the acceptance of the erectors' offer of 55 cents per hour, and the union men have resumed work.

Old Material.—The market is practically at a standstill. The mills are holding back shipments on contracts while taking inventory, and there is very little buying. About the only demand is in wrought scrap and railroad malleable, in which there has been a small amount of business done. The sales in most lines have been insufficient to give an index to prices. The schedule we quote is largely nominal and covers gross ton prices, f.o.b. Buffalo:

Heavy melting steel	$13.25 to $13.50
Low phosphorus steel	18.00 to 18.50
No. 1 railroad wrought	16.00 to 16.25
No. 1 railroad and machinery cast scrap	14.50 to 14.75
Old steel axles	18.00 to 18.50
Old iron axles	22.50 to 23.00
Old car wheels	14.50 to 15.00
Railroad malleable	14.50 to 14.75
Boiler plate	11.75 to 12.25
Locomotive grate bars	11.50 to 12.00
Pipe	11.25 to 11.75
Wrought iron and soft steel turnings	6.50 to 7.00
Clean cast borings	5.50 to 6.00
No. 1 busheling scrap	12.25 to 12.50

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New York

NEW YORK, July 6, 1910.

Pig Iron.—Inquiries and transactions are of smaller volume and there are indications of midsummer quiet. In a few cases prices have been asked on lots of several hundred tons and two considerable inquiries from foundries are reported for the last half, one of 3000 tons in New York and one of 4000 to 5000 tons in New England. Foundries are fairly well provided for for the third quarter, and it is not expected that more than moderate activity will be seen in the next two months. The buying of lower grades by pipe foundries has continued and prices on Southern pipe iron have gone about 25c. below what has been commonly reported recently. Southern foundry grades have not been active in this district. Buyers of foundry iron continue to make offers below what furnaces are willing to entertain. Producers see in the further reduction of output an adjustment to consumption, which makes them less disposed to consider current prices for deliveries running into 1911. We quote Northern foundry iron at tidewater as follows: No. 1, $16.75 to $17; No. 2 X, $16.50 to $16.75; No. 2 plain, $16 to $16.25. Southern iron is quoted at $16.50 to $16.75 for No. 1 and $16 to $16.25 for No. 2.

Steel Rails.—The Tennessee Coal, Iron & Railroad Company has taken an order for 11,000 tons of rails for the San Antonio & Aransas Pass Railway Company and the Carnegie Steel Company will furnish 700 tons for the Elkins Electric Railway Company. McKenzie & Mann, the Canadian contractors, have bought 5000 tons from the Lackawanna Steel Company. An order for 2300 tons of ferrotitanium Bessemer rails for the Wheeling & Lake Erie is divided between Pittsburgh and Buffalo mills.

Ferroalloys.—Inquiries for ferromanganese are light and prices are not strong; in New York sellers are quoting about $39.50, seaboard. Although the supply of ferrosilicon for immediate delivery is not particularly heavy prices are weak and sellers are quoting around $57.50, Pittsburgh. There have been sales, however, at about $58. A western Pennsylvania steel company purchased 15,000 tons of spiegeleisen during the week in two lots of 7500 tons each. About $25 a ton was paid.

Finished Iron and Steel.—The month as a whole closed an unusually good June, although some falling off in business marked its last days. The remainder of the summer will probably be quiet. The past week has been especially dull, with its holiday and the fact that inventory and repair season is on in many plants. Plates and structural materials are in little demand, and even steel bars have been slow, with the result that deliveries are considerably improved, except for certain sizes. The bulk of business in this line is done in contracts, and the largest of these have been closed for the remainder of the year, at least so that for the next six months the new business will be less conspicuous. A fair trade in bar iron is reported, but plates in this territory are especially quiet. The only structural orders of size noted in this vicinity are the Pullman Building, Forty-fourth street and Madison avenue, 400 tons; the Warner Sugar Refinery, Edgewater, N. J., 1000 tons, both taken by the American Bridge Company, and the McGraw Building Annex, 800 tons, awarded the Hay Foundry & Iron Works. Among the best building contracts from other sections are the following: A hotel, 700 tons, and an office building, 350 tons, in Washington, D. C., taken by Barber & Ross; the tower of the Daniels & Fisher Building, Denver, 1000 tons, taken by M. J. Patterson; a building for the Milwaukee Electric Company, Milwaukee, Wis., 450 tons, taken by the American Bridge Company, and 800 tons of bridge work for the Toledo & Ohio Central, let to the Toledo-Massillon Bridge Company. A contract has also been closed for 400 tons for a mill building for the Canton Sheet Steel Company, Canton, Ohio. Bids have been asked for the Great Lakes Building, Chicago, for 3000 tons, and for a city hall at Oakland, Cal., to require 1500 tons. While some shading in prices has been reported, it does not appear to have been sufficient or of a nature to warrant changing the quotations—plain structural material and plates, 1.61c. to 1.66c.; steel bars, 1.61c. and bar iron, 1.50c. to 1.55c., all New York.

Cast Iron Pipe.—New York City will let contracts today for about 3800 tons. Apart from this the market is quiet. Carload lots of 6-in. are quoted at $24.50 to $25 per net ton, tidewater.

Old Material.—The situation is discouraging to holders of old material. The railroad lists out for this month are quite heavy, and an additional supply of scrap is thus coming on a market already overstocked. Consumers are not only buying very sparingly but are using every effort to secure lower prices. About the only articles in the list which maintain any show of strength are relaying rails, old steel car axles, wrought pipe, cast borings and heavy cast. Dealers having steel scrap contracts to fill have been able in the past week to buy small quantities at $13.25, delivered in eastern Pennsylvania. From present indications the market for old material seems destined to pass through an exceedingly quiet summer. Quotations per gross ton, New York and vicinity, are as follows:

Rerolling rails	$12.25 to $12.75
Old girder and T rails for melting	11.25 to 11.75
Heavy melting steel scrap	11.25 to 11.75
Relaying rails	20.00 to 21.00
Standard hammered iron car axles	21.50 to 22.00
Old steel car axles	17.50 to 18.00
No. 1 railroad wrought	13.25 to 13.75
Wrought iron track scrap	11.50 to 12.00
No. 1 yard wrought, long	11.50 to 12.00
No. 1 yard wrought, short	11.00 to 11.50
Light iron	5.50 to 6.00
Cast borings	6.50 to 7.00
Wrought turnings	6.75 to 7.25
Wrought pipe	11.75 to 12.25
Old car wheels	12.00 to 12.50
No. 1 heavy cast, broken up	12.00 to 12.50
Stove plate	9.00 to 9.50
Locomotive grate bars	9.00 to 9.50
Malleable cast	11.50 to 12.00

Metal Market

NEW YORK, July 6, 1909.

THE WEEK'S PRICES

Cents Per Pound.

	Copper.			Lead.		Spelter.	
June.	Lake.	Electrolytic.	Tin.	New York.	St. Louis.	New York.	St. Louis.
30	12.75	12.37½	{33.10 / 33.15}	4.37½	4.22½	5.20	5.05
July.							
1	12.75	12.37½	32.90	4.40	4.25	5.20	5.05
2	12.75	12.37½	....	4.40	4.25	5.20	5.05
5	12.75	12.37½	32.90	4.40	4.25	5.20	5.05
6	12.75	12.37½	32.80	4.40	4.25	5.20	5.05

There has been some activity in tin. Copper is quiet and unchanged. Lead is in a little better position and the price is higher. Spelter is quiet.

Copper.—The copper statistics for June show that the exports were not as heavy as in May, and in consequence buyers are not taking much interest in the metal, as they do not seem to fear that there will be any material advance as a result of the forthcoming figures of the Producers' Association. Copper is lower now than it was during the strong buying movement of several weeks ago, and consumers who were making heavy inquiries at that time are filling their wants by taking up small lots at prices decidedly under the quotations then given them. Plenty of electrolytic copper is now offered in New York at 12.37½c., and lake can be had at 12.75c. Figures compiled by the New York Metal Exchange show that the June exports of copper were 22,688 tons, and the total for the six months of this year shows a decrease of 18,998 tons, compared with the same period of last year. L. Vogelstein & Co. give the following figures of German consumption of foreign copper for the month of January-May, 1910: Imports, 69,700 tons; exports, 3312 tons; consumption, 66,388 tons, as compared with consumption during the same period in 1909 of 62,709 tons. Of the above quantity, 61,451 tons was imported from the United States. In London to-day spot copper was sold for £54 7s. 6d. and futures for £55 1s. 2d. The sales amounted to 700 tons of spot and 800 tons of futures. The market was dull. The exports of copper so far this month have been 5330 tons.

Pig Tin.—Although there has been a fair buying movement in pig tin, its present position is something of a disappointment considering the exceptional June statistics. It is thought in the trade that the existing prices are too high to be consistent with the demand. On June 29, as was then stated, it was made known that deliveries into consumption during June amounted to 5000 tons, and the total for the six months showed an increase of 3700 tons, compared with the same time last year. Considering the recent quiet condition in other nonferrous metal markets, this was an exceptionally good showing, and it was thought that the price would advance. On June 29 and 30 there was a fair buying movement and about 500 tons changed hands, but since Monday quotations have steadily receded, and to-day the market here was below the import cost. Yesterday afternoon tin was sold in this market at 32.90c., but the business was largely between dealers. As there were no transactions on Saturday, the business week was a short one and the holiday dullness may account for some of the lack of interest shown by consumers. In London to-day spot tin was sold for £149 15s. 6d. and futures for £150 15s. The sales amounted to 200 tons of spot and 270 tons of futures. The market was dull. The arrivals of tins so far this month were 740 tons and there are 2165 tons of float.

Tin Plates.—Tin plates are selling well in this market and some fair sized quantities are being taken by packers who make their own tin boxes in which to put up their goods. There is also a good sale for foreign tin plates, the price of which remains at 13s. 4½d. at Swansea, Wales. The price in New York for 100-lb. coke plates is $3.84.

THE MACHINERY MARKETS

Lead.—More interest is being taken in lead and the price has advanced, as outside sellers are now asking the same price as the American Smelting & Refining Company, which is 4.40c., New York. Last Friday it became known that a number of outside lots which had been offered in the West at 4.37½c., New York, were disposed of, and there was a prompt readjustment of prices on the part of other outside sellers. There is a fairly good call at this time from the lead pipe and sheet lead manufacturers. The demand for the metal from white lead manufacturers has fallen off, however, but it is estimated that the general demand is at least taking care of the production. The price of lead to-day is 4.40c., New York, and 4.25c., St. Louis.

Spelter.—Very little interest is being taken in spelter, but the producers manage to keep the price up. It is apparent that stocks are fairly well concentrated, and those who are aiming to keep the price around 5.20c., New York, notwithstanding the lack of demand, appear to be able to hold their own. The price of the metal at St. Louis is 5.05c. Stocks here are very scarce, but there is enough of the metal concentrated in the West to insure prompt and early shipment, even although a heavy demand should arise.

Antimony.—The antimony market is unchanged and the demand is light. Cookson's is 8.38½c. and Hallett's 8.12½c. These prices are weak.

Old Metals.—The demand is light. Dealers' selling prices, which are nominally unchanged, are as follows:

	Cents.
Copper, heavy cut and crucible	12.00 to 12.25
Copper, heavy and wire	11.75 to 12.00
Copper, light and bottoms	10.75 to 11.00
Brass, heavy	8.50 to 8.75
Brass, light	7.00 to 7.25
Heavy machine composition	11.00 to 11.25
Clean brass turnings	7.50 to 8.00
Composition turnings	9.25 to 9.50
Lead, heavy	4.05 to 4.20
Lead, tea	3.80 to 3.95
Zinc scrap	4.15 to 4.25

Metals, Chicago, July 5.—Consumers of metals are generally limiting their purchases to requirements of the immediate future. For longer delivery it is believed that 13c. could be shaded on lake copper in the Chicago market, but buyers do not seem interested in purchases for the future, and for spot shipment 13c. is maintained. The spelter interests are holding for higher prices, but the market is reported dull, possibly due to the fact that the wire and sheet mills are using less spelter at this season. We quote Chicago prices as follows: Casting copper, 12⅝c.; lake, 13c., in carloads, for prompt shipment; small lots, ¼c. to ⅜c. higher; pig tin, car lots, 33½c.; small lots, 35c.; lead, desilverized, 4.30c. to 4.35c., for 50-ton lots; corroding, 4.50c. to 4.60c., for 50-ton lots; in carloads, 2½c. per 100 lb. higher; spelter, 5.20c. to 5.25c.; Cookson's antimony, 10⅝c., and other grades, 9¾c. to 10¼c.; sheet zinc is $7.50, f.o.b. La Salle, in carloads of 600-lb. casks. On old metals we quote for less than carload lots: Copper wire, crucible shapes, 12¼c.; copper bottoms, 10½c.; copper clips, 12¼c.; red brass, 11¼c.; yellow brass, 9¼c.; light brass, 6¼c.; lead pipe, 4¼c.; zinc, 4⅛c.; pewter, No. 1, 24c.; tin foil, 26c.; block tin pipe, 30c.

Metals, St. Louis, July 4.—Lead is somewhat firmer and held at 4.25c. to 4.30c. Spelter is rather stronger, at 5.05c. to 5.10c., East St. Louis. Zinc ore is quoted at $38 to $39 per ton, Joplin base. We quote tin at 33.30c. per lb.; antimony, 8.60c.; Lake copper, 13.10c.; electrolytic copper, 12.75c., all St. Louis. The demand for finished metals ruled good during the past week.

Iron and Industrial Stocks

NEW YORK, July 6, 1910.

What is claimed to have been the worst break in the stock market since the panic of 1907 occurred last Thursday. The cause assigned for this break was the order of the Interstate Commerce Commission reducing freight rates on railroads reaching jobbing points in the States of Washington, Utah and Nevada. While the railroad stocks bore the brunt of the downward movement, industrial stocks necessarily sympathized. The market since then has been weak, with occasional reactions from lowest prices. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chalm., com..	8½ - 8½	Railway Spr., com.	30¼ - 32¾
Allis-Chalm., pref..	29¾ - 30½	Railway Spr., pref.	95 - 95⅝
Beth. Steel, com...	23 - 25	Republic, com.....	29 - 31½
Can, com.....	6⅞ - 9	Republic, pref.....	91 - 92½
Can, pref.....	67¼ - 69⅝	Sloss, com.....	63¾ - 66⅝
Car & Fdry, com..	48⅛ - 53	Sloss, pref.....	114
Car & Fdry, pref...	109 - 112	Pipe, com.....	15 - 16
Steel Foundries...	51 - 51¼	Pipe, pref.....	54 - 55⅝
Colorado Fuel.....	30 - 33¾	U. S. Steel, com...	68½ - 75¼
General Electric...	138¼ - 142½	U. S. Steel, pref...	113⅜ - 115
Gr. N. ore cert.....	49¼ - 56½	Westinghouse Elec.	58⅜ - 62
Int. Harv., com...	93 - 97	Am. Ship, com.....	80
Int. Harv., pref...	119 - 121	Chi. Pneu. Tool...	37 - 38
Int. Pump, com...	43⅛ - 43¾	Cambria Steel.....	41½ - 44½
Int. Pump, pref...	80 - 81	Lake Sup. Corp....	15 - 21¼
Locomotive, com...	38½ - 41	Pa. Steel, pref.....	105
Locomotive, pref...	107 - 107½	Warwick	9¾ - 10¼
Nat. En. & St., com.	17 - 17½	Crucible St., com..	10¾ - 11⅝
Pressed St., com..	30¼ - 32¾	Crucible St., pref..	76½ - 79¾
Pressed St., pref..	95 - 96	Harb.-W. Ref., pref.....	94

The William Cramp & Sons Ship & Engine Building Company, Philadelphia, reports the following results for the year ended April 30:

	1910.	Decrease.
Income	$716,141	$31,808
Fixed charges	289,714	12,082
Surplus	$462,427	$19,726

During the year the company paid off $220,000 20-year 5 per cent. notes and $25,000 first mortgage 5 per cent. bonds and expended $87,953 in the purchase of real estate, tools, machinery, &c.

June Ore Shipments Break the Record

CLEVELAND, OHIO, July 6, 1910.—(*By Telegraph.*)—June ore shipments broke previous records for any one month. The total was 7,316,679 gross tons. This is an increase of 123,480 tons over the previous record, which was made in August, 1909. Shipments up to July 1 were 14,522,058 tons, which is a gain of 5,819,735 tons over the same period last year.

The Connellsville-Buffalo Coke Rate.—The United States Court of Appeals has reversed the decision of the lower court, which granted the steel companies at Buffalo an injunction restraining the railroads from placing in effect their announced increase in the freight rate on coke from the Connellsville district to Buffalo. The reversal order provides, however, that the decision shall not go into effect until July 15, pending an appeal to the Supreme Court. The steel companies of the Buffalo district will at once file an appeal asking for a stay or reinstatement of the order originally granted and will make a strenuous effort to secure it.

The H. F. Brammer Mfg. Company, Davenport, Iowa, manufacturer of washing machines, whose entire plant, including warehouses and raw material, was destroyed by fire June 26, has arranged temporary quarters which will enable it to take care of its customers within three or four weeks. New buildings of fireproof construction, of larger dimensions than those burned, will be erected as quickly as possible. New equipment for all departments will be required upon completion of the new plant, as well as necessary equipment for a steam power plant.

King George V of England, who was elected an honorary member of the Iron and Steel Institute when Prince of Wales in the year 1905, has been pleased to become patron of the Institute. Among other honorary members is the Archduke Friedrich of Austria, who was elected in 1907. The late King of Sweden and the late King of Belgium were honorary members at their decease and had held such membership for many years.

The Taylor Steel Company, Canton, Ohio, manufacturer of crucible steel castings, alloy steel castings for automobile parts and special malleable iron castings for auto parts, has decided to build a plant for the manufacture of crucible steel forgings. The site has not yet been selected, but it will be shortly. The company will be in the market for considerable equipment for the new works.

The American Car & Foundry Company

Eleventh Annual Report—Year Ending April 30, 1910

The income account of the American Car & Foundry Company for the fiscal year ending April 30, 1910, makes the following showing as compared with the previous year:

Net earnings	$5,725,098	Inc. $1,983,123
Renewals, repairs, &c	1,635,620	Inc. 789,476
Surplus available for dividends	$4,089,478	Inc. $1,193,647
Preferred dividend	2,100,000	Unchanged.
Balance	$1,989,478	Inc. $1,193,647
Common dividend	600,000	Unchanged.
Surplus	$1,389,478	Inc. $1,193,647
Previous surplus	22,563,078	Inc. 195,831
Total surplus	$23,952,556	Inc. $1,389,478

The net working capital at the close of the year, excluding reserves, was $17,770,023. The general balance sheet, as of April 30, 1910, is as follows:

Assets.

Property and plant account		$66,182,532.51
Cost to April 30, 1909	$64,044,377.66	
Additions to steel car plants at Berwick, Detroit and Wilmington and new steel passenger car plant at St. Charles	676,134.32	
Reservation for construction of and additions to steel car plants	1,462,020.53	
Current assets		34,685,434.66
Materials on hand, inventoried at cost or less, about 85 per cent. of which will be used on cars we have contracts to build	$18,763,222.80	
Accounts and notes receivable	12,278,781.68	
Stocks and bonds of other companies, at cost, or less	701,868.78	
Cash in banks and on hand	2,941,561.40	
Total		$100,867,967.17

Liabilities.

Preferred stock		$30,000,000.00
Common stock		30,000,000.00
Current liabilities		12,725,223.63
Audited vouchers for material and notes payable, not due; and pay rolls (paid May 10, 1910)	$12,050,223.63	
Dividend No. 45 on preferred stock (payable July 1, 1910)	525,000.00	
Dividend No. 31 on common stock (payable July 1, 1910)	150,000.00	
Reserve accounts		4,190,187.46
For insurance	$1,000,000.00	
For purchase price of Wilmington plant	500,000.00	
For general overhauling, improvements and maintenance	628,166.93	
For construction of and additions to steel car plants	1,462,020.53	
For dividends on common stock, to be paid when and as declared by Board of Directors	600,000.00	
Surplus account		25,952,556.08
Total		$100,867,967.17

From President Frederick H. Eaton's accompanying remarks the following extracts are taken:

The past year has shown a marked increase of activity in all the departments of the company. This increase of activity, however, has not been uniformly distributed over the entire year. The pendency of Federal legislation affecting railroads and the possibility of governmental litigation during the closing part of the year have had the effect of very materially curtailing the railroads' demand for new equipment, so that by far the greater portion of the year's business was entered during the first half of our fiscal year just closed. Notwithstanding these conditions, the net earnings resulting from the company's operations during the past year show an increase of $1,193,647.37 over those for the preceding year; and the management is able to report that the company has on hand at the close of business April 30, 1910, orders for its different products considerably in excess of the orders on hand at the close of the two preceding years.

The report for the year ending April 30, 1909, showed a reserve of $1,138,154.85 for construction of and additions to steel car plants. Of this reserve there has been expended during the past year $676,134.32. By this expenditure we have built at the Peninsular plant, Detroit, an extension, giving us there an additional aisle; at Berwick, an extension to the steel passenger car department and a third aisle in the freight car department; at Wilmington, additions to the steel passenger car department, making now possible there the complete construction of steel passenger cars; and at St. Charles we have completed and equipped the steel passenger car shop we had in course of erection at the close of last year and have partly completed an additional shop. With this additional shop we will have at St. Charles a plant for the construction of all-steel passenger cars complete in all details.

In view of the increased demand for steel construction, particularly for passenger cars, the management considers the maintenance of an ample reserve for construction of and additions to steel car plants as of prime importance. To reimburse this fund for the expenditure made from it during the past year, and to keep the company in position for the carrying out of its fixed policy with regard to steel car construction, there has been added to this reserve $1,000,000, making the total of this fund carried over to the new year $1,462,020, as against $1,138,154 at the close of the fiscal year ending April 30, 1909.

From our reserve for general overhauling, improvements and maintenance, there was expended during the year the sum of $538,414.56—this amount covering various improvements in power houses, the installation of considerable new machinery at a number of plants, the electrification of several of the shops and the completion of the equipment of the new wheel and gray iron foundry at St. Louis. This leaves to the credit of this account $628,166—which, in view of the high condition of efficiency in which the company's plants have been at all times maintained, is deemed sufficient for the coming year without addition to this reserve.

In the president's letter for the preceding year it was said that "we have perfected plans for the prompt and timely construction of another steel car plant." The management did not consider it advisable to begin the construction of this additional steel car plant during the past year, deeming it, in view of existing conditions, more economical and in all ways preferable that the capacity of our existing plants should be increased by the making of the extensive improvements therein already referred to. We remain, however, prepared to construct this additional steel car plant, just as soon as, in the judgment of the management, the interests of the company will be best served by so doing.

In all the work of improvement of the plants, the management has had in mind the growing demand for steel in preference to wooden car construction; and the company is prepared for the time when cars of steel will entirely supersede those of wood.

Due to the conditions existing at the close of the fiscal year ending April 30, 1909, the business done during the past year was of necessity taken on a strongly competitive basis; and as a result the company has had to work on a narrow margin of profit. Considering these conditions as well as others above referred to, the management feels that the result of the year's operations has been, on the whole, satisfactory.

An estimate that the total number of immigrant aliens admitted at all ports of the United States in the fiscal year ending June 30 reached 1,035,545 has been made by Commissioner General Keefe. This is an increase of 283,759 over the number of immigrant aliens admitted last year.

Trade Publications

Steels.—The Royal Metal Steel Company, Broadway and Sixty-fourth street, New York City. Catalogue. Size 6 x 9 in.; 24 pages. Lists a number of foreign high speed, automobile, electrically treated and alloy steels which the company handles as the manufacturers' American representative. Altogether about 30 brands are mentioned, with a brief description of their properties and the purposes for which they are intended to be used. A list of different automobile parts with the brands recommended for making them completes the catalogue.

Steel Ball Burnishing Process.—The Abbott Ball Company, 14 Hicks street, Hartford, Conn. Circular. Relates to the treatment of metal goods by the burnishing and tumbling process, which takes the place of buffing both before and after plating on practically all kinds of small metal goods. This operation is said to be very simple and the advantages claimed for the process are that large quantities of work can be handled at a great saving of time and money.

Polyphase Motors.—Wagner Electric Mfg. Company, St. Louis, Mo. Bulletin No. 82. Covers a line of polyphase motors which are made in standard sizes from 1 to 75 hp. Touches upon the latest developments in the art of building polyphase motors and discusses the relative adaptability of the polyphase and single-phase types. Space is also given to the principles upon which an induction motor is designed and operated and the advantages of the slip ring and squirrel cage models. The principal features of the construction of this line of motors are given and there are several illustrations showing different sizes of motors both singly and operating machinery such as planers, air compressors, conveyors and a turbine pump.

Roofing.—H. W. Johns-Manville Company, 100 William street, New York City. Mailing card. Describes the uses and advantages of the J-M asbestos roofing, which is composed of pliable sheets of asbestos felt saturated with asphalt. Several of these sheets are cemented together with asphalt forming a composite roofing fabric which, it is stated, will not dry out under the combined action of sun and air.

Water Softeners.—Dodge Mfg. Company, Mishawaka, Ind. Two wall hangers. Size 13¼ x 20 in. Treat of the Eureka water softener, an exterior view of which is shown on one of the hangers and a sectional colored view on the other.

Disk Grinders.—Charles H. Besly & Co., Chicago, Ill. Catalogue, 6 x 9 in.; 78 pages. Points out the special features of the Besly spiral disk grinders and band polishing machines. All the different sizes of machines of this extensive line are illustrated and briefly described and space is given to various grinding fixtures, exhausters and accessories such as Helmet spiral circles, cement, glue and oil.

Condensers.—Wheeler Condenser & Engineering Company, Carteret, N. J. Bulletin No. 106. Calls attention to the use of high vacuum surface condensers for steam turbine use, built by this company. The bulletin describes the arrangements of the tube surface, the use of rain plates and other means employed to secure high steam economy without unnecessary consumption of power by auxiliaries or the use of excessive amounts of cooling water, and is illustrated by numerous half-tone and line engravings. An illustrated description of this condenser was printed in *The Iron Age* March 3, 1910.

Machinery.—Beck & Corbitt Iron Company, 1238 N. First street, St. Louis, Mo. Catalogue No. 7. Shows the different lines handled by this company, which include gasoline engines, power hammers, disk sharpeners, emery grinders, buffing and polishing lathes and woodworking machinery. Accessories such as saw mandrels, circular saws, pulleys and shafting and hangers are also illustrated.

Sewer Inlets.—The Burch Plow Works Company, Crestline, Ohio. Pamphlet. Covers a number of different types of sewer inlets and manhole covers. These are made for installation at corners and in curbs and at the roadside for conducting surface water into sewers and underdrains at bridge approaches, road crossings, driveways, underdrains, intersecting country roads, and for suburban work in general. An iron manhole cover for use in the center of the street and expansion cast iron culvert pipe, which is made in two sections that are held in place by lugs, are also shown.

Typesetting Machines.—Lanston Monotype Machine Company, Philadelphia, Pa. Booklet. Size 8½ x 15¼ in.; 36 pages. Contains a brief account of the Monotype machine and its development. This description is supplemented by a number of illustrations showing the various portions of the plant where the machine is built and the different steps in its construction.

Automatic Mine Car Stop.—Automatic Car Stop Company, O'Fallon, Ill. Mailing card. Deals with an automatic car stop designed to be placed at the bottom of the shaft to keep cars from running into the sump. It eliminates the use of boards and other material commonly used for this purpose and in addition is said to give the operator a more uniform hoist.

Screw Machine Tools and Parts.—The National-Acme Mfg. Company, Cleveland, Ohio. Catalogue. Size 7 x 9 in.; 46 pages. Contains an illustrated and tabulated list of tools and parts for the Acme automatic multiple-spindle screw machine, an illustrated description of which was printed in *The Iron Age* June 4, 1908. All of the tools and attachments used on the machine as shipped to-day are shown, numbered to facilitate the ordering of repair parts.

Alabama Blast Furnace Conditions.—BIRMINGHAM, ALA., July 6, 1910.—(*By Telegraph.*)—The Sloss-Sheffield Steel & Iron Company has blown out another furnace in this city. The Southern Iron & Steel Company put out its Alabama City furnace. Only eleven furnaces in this State are in blast on foundry iron, representing about 60,000 tons a month. From 10,000 to 12,000 tons of pig iron was sold here last week.

The Wheeling Mold & Foundry Company, Wheeling, W. Va., has been awarded a contract by the McClintic-Marshall Construction Company, Pittsburgh, for material to be used on the Panama Canal, for lock work, for which the latter company has the general contract. The contract includes iron and steel castings, bronze, vanadium and nickel steel, and all machine work in connection with them. Deliveries are to extend over a period of two years. The initial shipment is to be made shortly after the first of the year. It will require less than one-half the capacity of the company's Wheeling plant to fill the contract, and will not interfere in any way with its rolling mill and steel works casting business.

The Follansbee Brothers Company, Pittsburgh, has placed contracts for two new 30-in. sheet mills and other extensive improvements to be made at its Follansbee, W. Va., plant. The new mills will be of heavy construction and modern in every detail. Each will have two stands of rolls, which will give the company a total of 23 stands of rolls, including nine cold rolls. The rolls and equipment complete will be furnished by the National Roll & Foundry Company, Pittsburgh, with works at Avonmore, Pa. The new mills will be electrically driven by power generated by low pressure turbine engines. The plans include a change from steam to motor-drive for the present bar mills.

A number of the men formerly employed in the sheet mills of the Youngstown Sheet & Tube Company, Youngstown, Ohio, that have been on strike since July of last year, have made applications for their old positions. Some have been put to work and others will be as fast as there is an opportunity. The Amalgamated Association has not as yet officially declared off the strike at these sheet mills, but most of the men have decided on their own account to return to work.

The members of the Eastern Pig Iron Association have accepted an invitation from Witherbee, Sherman & Co., Inc., to be the guests of the company at Port Henry, N. Y., Wednesday, July 27, when the midsummer meeting of the association will be held. An inspection trip will be made to the well known iron mines at Mineville. Most of the visiting party will leave New York Tuesday evening, July 26.

Under direction of President Taft the Tariff Board has mapped out a series of investigations in connection with each schedule of the tariff, and leading economists, technologists and statisticians will be employed to secure information. The sole instruction to the board by the President is to "get at the truth, regardless of whom it helps or hurts."

Among sales of locomotives last week by the American Locomotive Company were 10 Mallet articulated compound locomotives, the total weight of which will be 225,000 lb., to the Central African Railways, and four four-wheel saddle-tank locomotives, the total weight of which will be 56,000 lb., to Haney, Quinlan & Robertson, Toronto, Canada.

The Machinery Markets

There is a healthy demand for machinery in most parts of the country, although the expected summer dullness prevails in some lines. The railroads are still practically out of the market, as far as heavy buying is concerned. There are two large lists to be purchased against in the East, and in the West lists amounting to several million dollars are now before the trade. During the last week the Chicago, Rock Island & Pacific Railroad issued a list of from 12 to 18 machine tools in the Chicago market. In Milwaukee unprecedented hot weather has unsettled the market somewhat, but the fact that prices are stiffening on some classes of small equipment indicates that there is a good undercurrent of business in that territory. The automobile and agricultural industries are furnishing a generous support to the market and prospects of good crops contribute to the optimistic feeling. In Detroit there is a noticeable activity in the machinery trade resulting from shop additions, due to the growth of the automobile industries, and in Cincinnati the lathe makers and manufacturers of drills and planers notice an improvement, although stock taking is interfering with business there somewhat. The American Rolling Mill Company, Middletown, Ohio, has purchased about $12,000 worth of tools in the Cleveland market, which brought the June business of some machinery houses in that city up to a good figure. Business is quiet in Pittsburgh, but it has no element of weakness, and inquiries promise a better buying movement shortly. In Baltimore and in the South business is irregular and the principal demand is coming from the iron and steel plants and the textile mills. Labor troubles are causing some difficulty on the north Pacific Coast, and there is some slight delay in filling orders. Buyers are tolerant over the delay, however, and a good future business is promised. There is an unusual demand for engines, electric generating units and transmission equipment in the Southwest, but the demand for other lines of standard equipment is somewhat slow. In the far Central West the machinery demand is expected to continue quiet until after the harvest. Current business is dull in the Northwest, but it is judged from inquiries now before the trade that a buying movement is due there in August.

New York

NEW YORK, July 7, 1910.

The machinery trade in New York is quiet, but the holiday has interfered so much with the week's business, coming as it did on Monday following the Saturday half-holiday, that it is hard to judge just what the actual conditions might be. The railroads continue to delay purchasing against the lists now before the trade and there is a lessened demand from the general manufacturing trade caused in some quarters by the usual shut-down at this time of the year for stock taking purposes. In the shoe manufacturing business and in the jewelry trade, especially, it is customary to close down during the week in which the Fourth of July occurs, and some shops close down for a fortnight for stock taking, unless business is unusually good. There is a good volume of inquiries before the trade and most of them are of a nature that indicates that those inquiring will make purchases in the near future. The demand for second-hand machinery continues good and it is thought this may be due to recent reductions in prices asked for that class of equipment. When makers of most classes of new machinery were so far behind several months ago the price of second-hand machinery for immediate delivery was advanced perhaps beyond its value and in some cases the price put on equipment was prohibitive to many who were in need of used machinery. The manufacturers of dredges, steam shovels, excavating equipment, hoisting engines and other out-of-door machinery are doing an especially good business just now, as the open weather of the last two months has given an impetus to construction work. The contractors on the Catskill aqueduct have been generous buyers of late of this line of equipment.

The engineering firm of Sanderson & Porter, 52 William street, New York, has inquiries out for considerable power equipment for central station work. This company has contracts in hand for extensive improvements to the plants of the Tucson, Ariz., Gas, Light & Power Company; Tucson Rapid Transit Company, the Albuquerque, N. M., Gas, Electric Light & Power Company; the Grays Harbor Railway & Light Company of Aberdeen, Wash., and the Sheridan, Wyo., Electric Light & Power Company.

Among orders recently booked by the Crocker-Wheeler Company, Ampere, N. J., are the following: Two 1000-kw. engine type generators for the Republic Iron & Steel Company's Hazelton, Pa., plant; one 500-kw. engine type generator for the A. M. Byers Company, Pittsburgh, Pa.; one 175-hp. auxiliary pole motor for the Orford Copper Company of New Jersey, and two 500-kw. synchronous motor generator sets for the Gary, Ind., plant of the American Sheet & Tin Plate Company.

The Taylor-May Machine Company has been incorporated at Rochester, N. Y., for the manufacture of tools, machinery and automobile parts and accessories; also dies for use in the manufacture of typewriters. The principal portion of the machinery for the company's plant has already been purchased.

The Sterling Iron & Railway Company, Sterlington, N. Y., will install a crushing plant unit, including a No. 7 gyratory breaker and auxiliary apparatus.

The Syracuse Bridge Company, Syracuse, N. Y., is planning an addition to its works, 50 x 120 ft. The understanding locally is that it will be used mainly for storage of finished material.

It has been definitely decided at Perry, N. Y., to install another pumping unit in the municipal water works station, and funds for the purpose will be provided shortly.

Some additional equipment may be required in the near future by J. F. Friedel & Sons, Syracuse, N. Y., who have arranged for a four-story addition to their factory.

Bids for pumping machinery, including gasoline engine driven and motor operated triplex pumps, will be taken at Livonia, N. Y., by the Water Commissioners, until July 11.

The Saratoga Graphite Company, Saratoga Springs, N. Y., will install a crushing plant, including five heavy gravity pumps, such as are used in mining work for ore reduction.

The Thousand Islands Electric Light & Power Company, Clayton, N. Y., has just completed a new power plant, consisting of a Tait balanced draft gas producer, supplying two three-cylinder engines from the shops of the Foos Gas Engine Company, Springfield, Ohio, direct connected to two electric generators of 150 kw. each, built by the Crocker-Wheeler Company, Ampere, N. J., which are designed to operate in parallel. The plant was furnished and installed by James Beggs & Co., New York City.

Machinery for a thoroughly modern plant, comprising all of the improvements which have recently been brought out in this industry, has been installed by the Dyett Sand Lime Brick Company at Port Jefferson, N. Y. It includes three large steam boilers, Corliss engine, steel pressure cylinder, &c.

Charles L. Lewis, Ilion, N. Y., has been awarded a contract by the city of Spencerport, N. Y., for constructing water works in that city at a cost of $32,348. The firm of Morrison & Farrington, Syracuse, N. Y., are the consulting engineers on the work.

The Hudson Terminal Construction Company, 50 Church street, New York, is building a water works system for the city of Bridgeton, N. J., at a cost of $40,000. The Hudson Terminal Construction Company, of which H. Van Winkle is president, is purchasing all the equipment.

Bids will be opened July 14 at the office of the Department of Parks, Fifth avenue and Sixty-fourth street, New York, for furnishing new boilers for the conservatories in Central Park. The amount of security required is $3000.

S. DIESCHER & SONS,
Mechanical and Civil Engineers,
PITTSBURGH, PA.

THE MACHINERY MARKETS

Chicago

CHICAGO, ILL., July 5, 1910.

The Chicago machinery market is passing into the summer vacation period in fairly good shape. Business is naturally dull in July and no unusual developments are expected for some time. Trade on the whole has been good this year, when one considers the discouraging features of the market that would naturally tend to check the enthusiasm of buyers of machine tools. The long and persistent decline in the stock market, the political unrest, the bear talk in financial circles and other elements of that character, are bound to have a depressing effect on business, and in the face of it all the machine tool market has shown surprising vitality. A great many manufacturers will wait a month or two longer for crop news before making their plans for next year. There is not likely to be serious trouble on this score as the position of the farmer is pretty well assured. There are good crops of oats, hay and wheat, and if the corn crop should fall a little short higher prices will even the matter up for the producer, so that the farmer is on safe ground and there is nothing to discourage the manufacturers who are affected by agricultural conditions. There are pending in the market about a dozen large lists of machine tools from railroads, amounting altogether to several millions of dollars, and something will have to be done on these lists during the next month or two, as the railroads need the tools. When this business comes in it will give the machinery houses a good start of their fall trade.

The Sterling Foundry Company, Sterling, Ill., is erecting a foundry which will double the capacity of its present plant, and a two-story building, 40 x 85 ft., for erecting, finishing and shipping its products. Additional equipment to be installed will include modern exhaust cleaning mills and dust arrester, cinder mill, drawer type core oven, elevator, two motors, band saw, universal saw, grinding machines and sheet metal equipment. It is expected that the buildings will be completed by September 1.

The Fort Wayne Electric Works, Fort Wayne, Ind., has completed plans and specifications for a new factory building, 140 x 229 ft., and an office building, 60 x 140 ft, five stories. The buildings will be of reinforced concrete construction.

The Illinois Traction Company of Champaign, Ill., will complete this summer at Venice, Ill., one of the most modern steam driven plants in the West. The equipment is to include 12 water tube boilers, furnished by the John O'Brien Boiler Works Company, St. Louis, Mo.; a Hamilton-Corliss engine of 1500 hp., from the shops of the Hooven, Owens, Rentschler Company, Hamilton, Ohio; a 1000-kw. General Electric generator; a 3000-kw. vertical steam turbine and generator, built by the General Electric Company, Schenectady, N. Y.; Worthington pumps, Case cranes, &c. The work on the building is being done by the McClintic-Marshall Construction Company, Pittsburgh, Pa.

Cribben & Sexton, Chicago, will build a large foundry, powerhouse and several new shop buildings, in connection with their stove factory. Some of the contracts have already been let.

The Buckeye Foundry & Engine Company, Joliet, Ill., will furnish power equipment and other machinery for a manufacturing plant now being erected at Wichita, Kan., by the Wichita Cement Brick & Supply Company, which is 100 x 150 ft., two stories.

Francis M. Barton, 185 Jackson boulevard, Chicago, has prepared plans for a box factory, 60 x 125 ft., to be erected by H. R. Gibbons. It will be located on Orchard street.

The McKenzie Furnace Company, Chicago, whose offices are at 84 Van Buren street, is completing a foundry and finishing shop, 75 x 300 ft., at Chicago Ridge, Ill. The necessary equipment has been provided, but this is likely to be extended a little later on.

Contracts have been made by the Freeport Casket Company, Freeport, Ill., for a two-story factory building, 48 x 160 ft., with wing, 32 x 48 ft. The equipment has been largely provided for.

Plans are under consideration at Clinton, Ill., for driving the pumps in the municipal water works with electric motors instead of by steam power as at present. No definite decision in the matter, however, has yet been reached.

A three-story addition, 80 x 160 ft., is to be made this summer to the plant of the Link Belt Company at Indianapolis, Ind.

The Hawks Electric Company, Goshen, Ind., is preparing to erect an electric generating station of considerable size, the equipment of which has been partially arranged for.

Philadelphia

PHILADELPHIA, PA., July 5, 1910.

The local machinery market has felt the influence of the national holiday, as well as the customary closing of plants for midsummer repairs and stock taking. Under these circumstances the volume of business closed has been comparatively light. Merchants' sales have been confined to single tools, principally lathes, drill presses and the smaller run of tools. Few inquiries of any importance have developed, although there is considerable business in sight, and the volume continues to increase, but it will be late in the fall before some of these propositions will develop into business. Little has come from the railroads; one inquiry for a few grinders has been put out by the Pennsylvania Railroad, but lists covering any material quantity of equipment are conspicuously absent. Special tools and machinery have been in light demand, although a fair inquiry for power equipment and power transmission machinery is still to be noted.

Appleton & Burrell have a contract for a two-story engine house, 28 x 34 ft., at 1202 and 1204 Brandywine street, from plans by Ballinger & Perrott, to be built for the Bilgram Machine Works.

The Pennsylvania Equipment Company, West End Building, is in the market for a second-hand 18 x 30 in. mine hoisting engine.

The Leo-Niessen Company has acquired property 59 x 100 ft. at Twelfth and Spring streets, and is having plans prepared for a seven-story reinforced concrete commercial building to be erected on the site.

The contract for the tower for the water system of Beach Haven, N. J., has been awarded to the Philadelphia Iron Works of this city.

Arrangements have been completed by which the plants of M. H. Treadwell & Co., Lebanon, Pa., Stoever Foundry & Mfg. Company, Myerstown, Pa., and Lebanon Steel Castings Company, Lebanon, Pa., will erect combined plants on a tract of 28 acres in Easton, Pa., recently acquired. The new plants will have about twice the capacity of the present ones. They will be operated entirely by electric power supplied from local sources. Work at the old plants will continue until the new buildings and equipments are ready so that no time will be lost in manufacturing or in making delivery on orders at any of the three plants.

The Pennsylvania Railroad Company will ask for proposals at an early date for the erection of additions to its shop to be built in Northumberland, Pa.

It is reported that the new saw factory of the Union Saw Company at Frackville, Pa., formerly of Williamsport, Pa., has been practically completed, and will be started in full operation at an early date.

The Department of Public Works, Philadelphia, will receive proposals until July 20 for the construction of a sewage disposal plant from plans and specifications by the Bureau of Surveys. This will be the first of a series of these plants, and will be located in the Holmesburg district. Information and plans may be had from George R. Stearns, director, City Hall. Experiments for this work have been conducted for a long time, and the plant to be erected will demonstrate the practical value of the system used, which, if satisfactory, will be adopted at other plants to be erected.

New England

BOSTON, MASS., July 5, 1910.

The market has suffered from the combination of extreme hot weather with a holiday. Last week business was by no means stagnant, however, the dealers reporting scattering sales totaling very good figures. It is too early to tell what July will bring forth, but naturally there will be a let-down. The vacation period is on, and the men having the controlling influence as to purchases are each year shortening their business hours and lengthening their vacations, which means concentrating attention on the routine of business rather than on plans for enlargement of manufacturing facilities. Nothing more has been heard of the proposed purchases of machinery by the Thomas S. Plant interests for the Wonder Worker Shoe Machinery Company. The award of a contract for one of the new submarines to the Lake Torpedo Boat Company, Bridgeport, Conn., will mean increased activity at the works in that city, and it is hoped that the three other boats of this class carried by the naval appropriation bill will be constructed for the Electric Boat Company, New York, at the yards of the Fore River Shipbuilding Company, Quincy, Mass. The supply business remains good, considering attendant circumstances. Prices are maintained, and deliveries are prompt, with the

THE MACHINERY MARKETS

exception of twist drills, concerning which there is some complaint.

The machine tool warehouse of the Chandler & Farquhar Company, Boston, Mass., was wet down for the third time in a few years, Sunday morning, as the result of a fire in the upper stories of the building. One section of the space occupied by machinery escaped the water and prompt action saved the balance of the stock from very serious damage.

The city of Haverhill, Mass., contemplates the establishment of a municipal electric plant, either by the purchase of the existing electric cmopany's property or by the building of a new station.

Additions to general manufacturing facilities in New England include the following: Vanderhoef & Co., Norwalk, Conn., straw goods, two-story addition, 60 x 125 ft.; Brampton Woolen Company, Newport, N. H., one-story weave shed, 90 x 90 ft.; Lawrence Dye Works, Lawrence, Mass., new plant; G. S. Jennings, Bridgeport, Conn., carriage factory, 50 x 113 ft., three stories; Derby Rubber Company, Derby, Conn., reclaimed rubber, additional buildings to double capacity.

The plant of the newly organized Sharp Mills, New Bedford, Mass., will be on a very large scale, with a total floor area of 520,000 sq. ft. The main mill will be 136 x 565 ft., five stories, the engine room 122 x 160 ft., with two beds for cross compound engines, the boiler room 141 x 164 ft., to be equipped with 14 boilers, and a storehouse, 70 x 316 ft., three stories.

M. M. Bartlett, Winsted, Conn., recently superintendent of the Winsted Scythe Company, will establish a business for the manufacture of scythes, lawn mower blades, corn and tobacco knives and leather belting. The new company, which is now organizing with a capital stock of $20,000, will occupy the factory building at Mooreville, formerly the plant of the Standard Mfg. Company. New Equipment will be required, including grinding machines, presses and oil fuel blowers. The factory is a modern building, 25 x 170 ft., and contains machinery that can be adapted to the wants of the new owners. Mr. Bartlett is a veteran scythe manufacturer. Before going to Winsted he was with the North Wayne Tool Company, North Wayne, Maine, and later managed the scythe department of the Hubbard & Blake Company, Oakland, Maine. The leather belting department of the new company will be equipped with a new type of machinery, a recent Scotch invention, designed to reduce cost of manufacturing.

The Winsted Hardware Mfg. Company, Winsted, Conn., is in the market for a varied list of machinery for the manufacture of articles from sheet metal and wire. This is a new corporation, with authorized capital stock of $100,000, chartered under Connecticut laws. Thurlow H. Bronson is the president, Arthur A. Griffin secretary and Stuart B. Camp treasurer. A factory has been secured and the work of equipping it is already under way. The product will be upholstery hardware, bright wire goods, cup and screw hooks, bird cage hooks, drawer pulls, towel bars, sash lifts, molding hooks, picture nails, sash and curtain rods, pole brackets, porcelain picture and shutter knobs, closet screws, nuts and washers.

The North & Judd Mfg. Company, New Britain, Conn., manufacturer of saddlery hardware, will build an addition to its annealing room 70 x 94 ft., and an addition to its brass factory 60 x 105 ft. The foundations are already completed.

The George E. Wood Tool Company, Southington, Conn., manufacturer of screw drivers and hardware specialties, which is controlled by the Stanley Rule & Level Company, New Britain, is planning to build an additional factory in the near future.

The Industrial Improvement Association, Southington, Conn., proposes to erect an industrial building, space in which will be rented to manufacturing concerns. Subscriptions already obtained assure the carrying out of the enterprise.

The Aluminum Castings Company, Cleveland, Ohio, manufacturer of aluminum, brass and bronze castings, is making additions and alterations at its plant at Fairfield, Conn., which will double its capacity.

The Leighton Machine Company, East Manchester, N. H., manufacturer of knitting machinery, will erect a two-story shop building 40 x 240 ft., with wing for office and a power house.

The power plant of the Hartford Electric Light Company, Hartford, Conn., will be equipped with two Curtis steam turbines of about 5000 kw. each, together with the necessary battery of boilers.

Cincinnati

CINCINNATI, OHIO, July 5, 1910.

In the machine tool trade conditions show the customary midsummer dullness, and a number have taken advantage of the opportunity afforded by the coming of the national holiday on Monday, to take stock and look over the shop equipment, shutting down from the evening of June 30 to July 5. Reports from the lathe manufacturers indicate that nearly all have business enough booked to carry them through the July and August period and in one or two instances large concerns making a specialty of lathes are booked up on standard sizes to October. A considerable improvement is noted in the demand for radial drills as well as planers, although manufacturers making a specialty of these heavier types report that the first half of the month showed a better record in sales than the last.

Manufacturers of electrical tools, particularly the portable types, report business excellent. The Hisey-Wolf Company, the foundations of whose new factory in Camp Washington are laid and the structure well along, reports June the best month in its history.

The Cincinnati Traction Company has an order under way at the shops of the Cincinnati Car Company for 50 new open summer cars of a new type with flat roof minus raised deck ventilators and with an enlarged rear platform where will be built a smokers' bench. This order with one placed recently for 50 of the pay-as-you-enter type means an outlay of $400,000 already this year for new equipment.

There is a local movement on for an organization of employing foundrymen. Several meetings have been held, at which appreciated assistance was rendered by Secretary Manley of the Cincinnati branch, National Metal Trades Association, and a strong organization of foundry owners in this section, which will have the moral support and sympathy of the members of the Metal Trades Association, is an early possibility. There are conditions in the trade, in addition to the extreme dullness that is just now giving the craft much concern, that require special treatment. It is expected that every shop doing any kind of jobbing will become a member.

The fortieth anniversary of the establishment of the foundry of Richter & Co., at Cincinnati, was celebrated July 1 with a banquet and appropriate exercises. The business was started by Joseph A. Richter as a brass foundry and on a small scale in the rear of a cutler's establishment on Main street near Ninth. Later the business was established at 210-214 East Ninth street, the foundry's present location. The day was also selected for the incorporation of a new company which will conduct the business in the future under the name of The Richter Company, with a capital of $80,000. The incorporators are Edward B., John H., Charles H., Louis A., Amelia, J. H. and Joseph A. Richter.

The Ashland Iron & Metal Company is a new incorporation with a capital of $10,000, at Ashland, Ohio, by A. Talaznek, Sarah Talaznek, J. Milner, J. M. Bernstein and E. E. Gross.

The Watt Mining Car Wheel Company, Barnesville, Ohio, has increased its capital stock from $75,000 to $125,000.

The Elwood Iron Works Company is a new incorporation for Elwood, Ind., to manufacture machinery parts. The capital stock is $50,000 and the directors are Wayne Leeson, Thomas Connor, W. N. Durbin, T. E. Palmer, George Pohl, M. J. Fogarty and C. C. de Hority.

The Incandescent Light & Stove Company has acquired a 3½ acre site in Oakley, Cincinnati suburb, and will erect a plant 60 x 250 ft.

The American Steel Grave Vault Company at Galion, Ohio, has increased its capital stock from $25,000 to $50,000.

The Steel Mfg. Company has been incorporated at Newark, Ohio, by T. J. Costello, L. B. Richards, J. W. Bower, Katherine M. Shaugnessey, J. A. Flory. The capital stock, $10,000.

The Western Ohio Railway Company at Lima, Ohio, has increased its capital stock from $3,400,000 to $4,000,000.

The property of the Huron Steel & Iron Company at Norwalk, Ohio, which has been in the hands of receivers for five months, was sold at auction on June 25 to the Assets Realization Company of Camden, N. J., represented at the sale by S. W. Swabey of Chicago, general counsel of the company. The bid that secured the property was nearly $61,000 more than the appraised value and the new owners have advised that they will take it over as soon as the sale is confirmed. The identity of the purchasing concern is not revealed, but the statement is made that it is one of the largest and most influential in the country and that it will operate the plant on a larger scale than ever before.

Charles Horix, general manager of the Vulcan Steam Shovel Company, Toledo, Ohio, announces that the plant will be removed to Evansville, Ind., about January 1. Evansville capitalists have donated a site and given a substantial bonus. The Bucyrus Steam Shovel Company of Milwaukee, Wis., and the Toledo plant are controlled largely by the same directors, and the Evansville location is in line with their policy to seek a Southern outlet for their commodities.

The plant of the Ohio Shovel & Stamping Works at Canal Dover, Ohio, which was destroyed by fire on June 21, will be rebuilt. The building and contents were insured for $13,500 and the loss was estimated at $15,000. The plant was established three years ago and has grown steadily.

THE MACHINERY MARKETS

Cleveland

CLEVELAND, OHIO, July 5, 1910.

While taken altogether the market is not active, a few of the machinery dealers report a fair volume of business during the week and some improvement over the previous week. While June as a whole was not a busy month, the local machine tool houses are fairly well satisfied with the amount of business booked, which in volume about equalled that of May. With vacation time coming on and the usually dull period of the year, dealers will not be surprised if orders are rather light during the next few weeks. Among the larger purchases reported during the week was about $12,000 worth of tools by the American Rolling Mill Company, Middletown, Ohio, whose list was noted several weeks ago, and tools aggregating about the same amount by an Ohio automobile concern. Another automobile manufacturer in this State has an inquiry out for about $35,000 worth of tools. While other automobile makers do not appear to be buying extensively at present there is a fair volume of single tool orders from this source. Among the general inquiries pending there are a number for lots of about half a dozen tools. A very good demand for gear hobbers in all sizes is noted. The demand for milling machines continues active, with considerable uncertainty about deliveries. One maker can make prompt deliveries on some sizes has withdrawn others because of being sold so far ahead, and is not promising shipment on other sizes until as late as next June. There is a good demand for second-hand machinery and dealers say they could sell more if they had the desired tools in stock.

In the foundry trade the demand for light gray iron castings is holding up well and foundries generally have nearly all they can do. Some report that they would be running at their maximum capacity could they secure more molders, of which there seems to be somewhat of a scarcity at present.

The Republic Rubber Company, Youngstown, Ohio, will enlarge its plant by the erection of an addition, 80 x 200 ft., five stories and basement. Plans are being prepared by the Osborn Engineering Company, Cleveland. Later the company expects to build an addition to its power plant.

Plans for various municipal improvements in Hudson, Ohio, have been prepared by D. M. Hosford, engineer, Caxton Building, Cleveland. Contracts will be placed shortly for a lighting plant. The specifications provide for gas engine of about 150 hp., a gas producer and a 100-kw. generator.

Plans for a water distribution plant for the Athens State Hospital at Athens, Ohio, are being prepared by the Osborn Engineering Company, Cleveland. Boilers, pumps and some other equipment will be required.

Plans for a new plant for the Tropical Oil Company, Cleveland, have been prepared by the Moore Engineering Company. A building of steel and reinforced concrete will be erected on West Seventieth street. It will be a three-story structure, 42 x 120 ft. Only special machinery will be required.

The Royal Rubber Company, Akron, Ohio, has purchased the plant of the Empire Mower & Reaper Company in that city, on which it has held an option for some time. The company's output will be increased and new machinery will be installed. The company will make a specialty of non-skid automobile tire. The company is capitalized at $50,000. J. C. Gibson is the general manager.

The Burt Mfg. Company, Akron, Ohio, reports that the demand for ventilators is holding up in a very satisfactory manner. Its business during May broke all previous records, both in the number of ventilators sold and in its aggregate business. Among the orders taken by the Burt company during the past few days is one from the D. M. Ferry Seed Company, Detroit, Mich., for 150 ventilators.

The Moore Heating & Mfg. Company, Akron, Ohio, has leased the space formerly occupied by the Hedgeland Mfg. Company in the power block on South Market street, Canton, Ohio, and expects to have it fitted up in about 30 days for the manufacture of warm air furnaces and stoves. The company will have 30,000 sq. ft. of floor space.

The General Motors Company, which owns the Elmore automobile plant at Clyde, Ohio, has decided to make extensive extensions to that plant. It is announced that a new building, 200 x 250 ft., will be erected for manufacturing purposes.

The Lindsay Fence Company, Cleveland, will erect a new plant on East Fortieth street. The building will be 28 x 106 ft., three stories.

The Federal Foundry Supply Company, Cleveland, has increased its capital stock from $30,000 to $50,000.

The Cleveland Elbow Company, maker of stovepipe elbows, has taken out incorporation papers with a capital stock of $15,000. A. E. Pearce and others are the incorporators.

Pittsburgh

PITTSBURGH, PA., July 5, 1910.

The closing days of June and beginning of July have been attended by a quiet condition of trade without pronounced features of any kind. In this situation, however, no element of weakness appears. On the contrary, there is a strong undertone to the market, with excellent prospects for a heavy buying movement not many weeks hence. Machinery for general industrial service has been more frequently called for of late than shop tools or special equipment of any kind, although the foundry trade shows considerable activity and appliances for boiler shops, tank works, sheet metal plants, &c., see about as well as at any time during the year. Deliveries seem to be rather uncertain. Some manufacturers are prepared to make prompt shipments of standard apparatus, while others do not care to take contracts except for some distance ahead. Dealers have been able thus far to meet the requirements of their regular customers; but this is largely due to the varied sources of supply which many of them have provided, as well as to the liberal stocks carried, in consequence of which there has also been a good deal of scattering trade coming to this district which is ordinarily satisfied much nearer home.

The Erie City Iron Works, Erie, Pa., is reported to have taken the contract for a boiler and 150-hp. engine, the latter to be direct coupled to a 90-kw. alternating current generator in the plant to be built by the Newmanstown Electric Light Company, Newmanstown, Pa.

Dealers here expect to provide some equipment for a plant to be erected at Charlestown, W. Va., by the Baldwin Forging & Tool Company, which now operates prison shops at Columbus, Ohio. The new works will be constructed for larger capacity and furnished with the best modern tools.

The Pittsburgh office of the S. Obermayer Company is calling the attention of owners of brass, bronze and aluminum foundries in this district to the advantages of copper perforated chaplets of that company's manufacture. The use of one of these allows the molten metal to flow through the perforations in such a way that there is not the customary head or rod extending outside the casting.

Two boilers of 350 hp., an engine of 250 hp., electric generator set for lighting service and a line of heavy operating machinery have been installed in the remodeled plant of the Greenbrier Lumber Company, Neola, W. Va., which will be one of the most important buyers of that section in future of mechanical equipment of various kinds.

The Enterprise Electric Company, Warren, Ohio, is offering a new type of transformers for factory lighting service. They are wound for very low voltage, thereby, it is claimed, reducing the consumption of current and prolonging the life of small lamps used over machines.

The York Steam Boiler Works, York, Pa., is reported to have under consideration a two-story addition to its plant with dimensions approximately 50 x 60 ft.

The McCullough-Dalzell Crucible Company, Pittsburgh, has found this one of the best seasons in its 40 years' experience for the sale of equipment to steel and brass foundries.

The Gulf Refining Company, whose general offices are in Pittsburgh, is reported to have decided upon a number of improvements to its various properties, including the erection of additional steel storage tanks at Uvalde, Texas.

The American Conduit Mfg. Company, Pittsburgh, is putting on the market a tubing known as galvanite, which is especially designed to carry electric wiring in power and industrial plants so as to eliminate fire hazard.

The Ridgeway Dynamo & Engine Company, Ridgeway, Pa., is making a very strong guarantee for its direct current generators, namely, that they will be sparkless in service at all points between no-load and 100 per cent. overload, without shifting of the brushes.

The Hollingsworth Wheel Company has been organized at Hagerstown, Md., to establish a manufacturing plant. The equipment will include woodworking machinery and tools for the production of metal parts, including wheel rims.

The A. Garrison Foundry Company, Pittsburgh, in addition to its regular line of standard and special machinery for shop and mill service, is making a specialty of turned, ground and polished chilled iron rolls, for which the demand this year has been uncommonly large, due to the severe service imposed upon the machinery of the plants in which they are used.

The plant and business of the Ohio Wagon Company, Wapakoneta, Ohio, which recently passed under the control of new interests, will be enlarged and improved machinery installed.

The motive power department of the Wheeling & Lake Erie Railroad is preparing a $200,000 list of tools and machinery needed to complete the equipment of its new shops at Brewster, Ohio. The list will be given out as soon as

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B. A. Worthington, receiver of the road, with headquarters at Cleveland, receives authority from the court to make the expenditure. It is the plan of the company to handle at the Brewster shops all the heavy repair work on the lines between Pittsburgh and Toledo.

Equipment which includes two steam boilers, a 150-hp. engine, air compressor, crushing plant, kilns, &c., has been installed by the Apollo Lime & Ballast Company, Apollo, Pa., as the first of several units of production. Additional machinery will be provided as the needs of the business develop.

The Wheeling Limestone Company, Wheeling, W. Va., has made some purchases of machinery for a large crushing plant to be located in the vicinity of Mt. de Chantal on the Baltimore & Ohio Railway, construction of which will be completed before fall. Other apparatus will be required later.

The Pittsburgh Machinery & Equipment Company, Fulton Building, Pittsburgh, Pa., dealer in railroad and contractors' equipment, has been appointed agent for the Davenport Locomotive Works, Davenport, Iowa, for the sale of railroad, mine and contractors' locomotives in western Pennsylvania, eastern Ohio and West Virginia.

The Aluminum Company of America, Pittsburgh, Pa., is building a large cofferdam of concrete at Messena, N. Y., replacing an old wooden structure, and not making an addition to its plant, as stated in *The Iron Age* of June 23.

Baltimore

BALTIMORE, MD., July 5, 1910.

More or less irregularity during the month of June is reported by machine tool builders and merchants, as well as general industrial concerns. Builders of tools and machinery continue actively engaged on work in hand, sufficient in the majority of instances to keep them well employed during the next three or four months, but have found it difficult to close up pending business, of which there is quite a good volume before the trade. Merchants have found conditions somewhat varied. Some lines have been quite active, others appear almost neglected. There has not been very much business in heavy machine tools, although power transmission equipment has been in good demand. A fair business in supplies is reported. Southern buying has not been particularly active, orders being confined largely to single tools and moderate quantities of supplies, sufficient for near future needs. Railroad purchases have been meager, although the Baltimore & Ohio Railroad has placed further orders for freight cars. Structural steel fabricators are busy, and, while no large contracts have been recently placed, several buildings and additions are being figured on for erection in Baltimore as well as in the South. Considerable municipal work is under consideration, and the demand for general contractors' equipment and supplies is good.

The T. C. Basher Company reports June as a satisfactory month. Several good orders for power equipment, as well as heating and ventilation projects, have been closed and other large contracts are in sight. The boiler plant of this concern is very busy on boiler and tank work, and has considerable business ahead.

The Detrich & Harvey Company has taken a moderate amount of new business, included in which were several open side planers for export. Shipments have been extensive and considerable business is on its books, but, while there has been some good inquiry for new tools, difficulty has in some instances been experienced in closing up pending inquiries.

The Baltimore Retort & Fire Brick Company has sufficient orders on hand to keep it actively engaged for at least three months. Several large contracts for brick for boiler installations as well as for special shapes for furnaces, both heating and melting purposes, have recently been booked.

The Baltimore Bridge Company has completed a moderate job of structural work for the Campbell Company, Camden, N. J., and are progressing rapidly with the work of erection of the addition to the Fidelity Building in this city. Extensive shipments against export orders for Central America recently reported are also being made. This company is quite busy, although recently orders have been of a rather miscellaneous character.

The Aumen Machinery Company has taken a contract to install for the Crown Cork & Seal Company an extensive system of conveying apparatus for transferring shipments from its plant to the freight yards of the Pennsylvania Railroad at the Union Station. The system will extend to all the different departments of the plant. A good general demand for machinery and supplies is reported, that for woodworking machinery being the most active. Individual orders, however, are usually small.

The Hollingsworth Wheel Company, Hagerstown, Md., is reported as being in the market for two new or second-hand return tubular boilers, 60 to 100 hp. each, and two new or second-hand Corliss engines, one of 70 and one of 35 hp.

The Baltimore Antiseptic Laundry Company has purchased additional property on Myrtle avenue, near Chatsworth street, on which it is proposed to erect an addition to the plant.

The Chesapeake Iron Works has booked orders for structural work in connection with the new Theatre Francais, a warehouse for R. Morris & Son in this city, and for the Wadsworth Building, Charlotte, N. C. The work of erection in connection with the Woodward Apartment House, Washington, D. C., has been completed, as has also the foundry building for Levering Bros. in this city. Southern demand for structural work is reported good and the plant continues very actively engaged.

The Ellicott Machine Company has, it is stated, given a contract to the Maryland Steel Company for the hull and boilers of a large suction dredge, for which it will furnish the machinery and general equipment. The hull will be 150 ft. long and 40 ft. in width, with a 16 ft. 9 in. depth of hold.

Consideration is again being given to plans by which the bondholders of the Baltimore Refrigeration & Heating Company would establish a large electric power plant in connection with the present plant. Those interested in the project are endeavoring to obtain a franchise for the city of Baltimore, on the success of which depends the carrying out of the present proposed plans.

Bids will be opened in a few days for an eight-story structural steel addition to the department store of the Hochschield-Kohn Company.

Plans have just come out for an addition to the department store of A. A. Brager, particulars regarding which are not available. C. M. Anderson is the architect.

Ground will shortly be broken by the Southern Can Company for the erection of a large warehouse and lithographing building at Lancaster & Wolf streets, from plans by Wyath & Nolting, architects. The building will be three stories and measure 96 x 118 ft., of brick and concrete and of fireproof construction throughout. The contract for the erection of the building has, we understand, been let to John Cowan, contractor.

On readvertisement but one bid, that of the Bennett Building Company, was received a few days ago by the Board of Awards, Baltimore, Md., for the erection of a new high pressure pumping station. The bid will be reported on by the board at its meeting next week.

The Fairbanks Company reports general sales as showing a betterment during June when compared with those of the previous month. The scale business shows a marked improvement, while that for machine tools and general equipment has been on about an even basis. Little inquiry in the way of extensive equipment is reported, transactions being largely in the smaller class of tools and machinery.

Crook-Kries & Co., successors to the Mechanical Department Crook-Horner Company, will move their office and showroom as well as drafting rooms from 227-231 West Saratoga street to the southwest corner of Park avenue and Saratoga street, where a three-story building, 20 x 110 ft., has been taken. This company has recently booked an order for installing a heating and ventilating system in the Notre Dame College. A 250-hp. boiler and a 75-kw. generator and a 110-hp. Erie ball engine, direct connected, will be installed. A new boiler house, 70 x 70 ft. is being erected to house the power plant, for which Charles L. Reeder is the engineer. Contracts for heating and ventilating the Falconer Building, Gay and Water streets, and some extensive work at Fort Moultrie, S. C., have also been booked, while an extensive conduit system is being put in at Fortress Monroe, Va.

Detroit

DETROIT, MICH., July 5, 1910.

In all of the territory naturally tributary to this market there exists at the present time a degree of activity in building new shops or additions to manufacturing establishments such as has never been known before. Every week plans are published that call for the expenditure of large amounts in structural work and equipment; and one of the most significant features of the situation is the fact that metalworking plants predominate. Much of this is due to the extraordinary development of automobile building and its subsidiary lines; but the metal trades as a whole are expanding at a rate that is absolutely unprecedented. What the effect will be upon the future of the market for machine tools and other equipment can only be conjectured; yet enough business is in sight to practically assure a steady run of buying

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for some months to come. So far as the projects now under way are concerned, the needs of plant owners in the way of equipment were largely anticipated during April, May and June, or even earlier, as most of them are the result of careful planning that began no later than last fall. They will, however, be followed by numerous others, particularly at interior manufacturing centers, announcements of which are likely to be made at frequent intervals all through the summer. Locally, the machinery trade does not present an appearance of any market activity, and during the worst of the heated season visible signs of activity will probably not be very manifest; still, the aggregate volume of inquiries is large, and considerable purchasing is being done in a quiet way.

In the line of foundry work the stimulating effect of the recent convention continues to be felt, and the correspondence of local manufacturers and supply houses is unusually heavy. To what extent this has thus far resulted in increased orders cannot be learned with any degree of certainty, but the trade appears to be in a most flourishing condition considering the season.

L. G. Hupp is arranging for the erection of a forge shop 70 x 100 ft., for the Hupp-Turner Company, Detroit. Nearly all of the apparatus needed is understood to have been purchased. Plans are also in progress for buildings to be occupied by the Hupp-Yeates Electric Car Company, newly organized, which will manufacture a patented type of electric automobile.

The Capitol Brass Works, Detroit, is introducing quite extensively this season the electro-magnetic separators of its manufacture, which have found a very practical application in machine shops, brass foundries, &c., for recovering valued metals from the floor refuse, &c.

The Saginaw Sheet Metal Works, Saginaw, Mich., is about to have work started on a one-story plant 150 x 270 ft.

Plans are being prepared by Smith, Hinchman & Grylls, Detroit, for a new factory building, to be occupied by the Roe-Stephens Mfg. Company. The details, however, have not yet been fully worked out, and provision for equipment is still to be made.

Benj. Middleditch, Detroit, who handles foundry supplies, has had a large trade for some time past in tumbling barrels for brass foundries, which he offers in a very substantial type of construction that will stand long service. In connection with his own plant a new foundry is being erected.

Temporary arrangements will be made at Port Huron, Mich., to strengthen the equipment of the water works station, but a new pumping engine is urgently needed and will probably be purchased in the near future.

The Dominion Stamping Company has just been organized here with the intention, it is stated, of building large works to furnish stampings for the use of automobile factories, but further particulars are lacking.

The Linderman Machine Company, Muskegon, Mich., has under construction a new shop, 66 x 106 ft., which will be used for erection work, the equipment including a 10-ton traveling crane as well as electric and pneumatic apparatus and other tools. The company's power and compressor capacity will also be increased.

Along with the heavy demand this year for the larger size cranes, the Northern Engineering Works, Detroit, has had more calls than in any previous period for jib cranes and small wall hoists, particularly for use in the numerous plants of only moderate capacity, which are under construction in all parts of the country.

The Booth Mfg. Company, Muskegon Heights, Mich., will remove in the near future to Howard City, Mich., where it is preparing to establish a plant in what was formerly the Skinner-Steenmán factory. Little, if any, new equipment will be needed at the outset beyond what has previously been in service.

The Hoskins Mfg. Company, Detroit, announces that in the manufacture of its electric furnaces, pyrometers and heating appliances it uses a special nickel-chromium alloy, which is produced in entirety in its own plant from the compounding of the metals through the various processes of rolling, annealing and drawing.

There will be a two-story building, 60 x 130 ft., completed this summer for the Detroit Granite Company. A contract for the structural work has just been awarded the Russel Wheel & Foundry Company, Detroit.

A foundry building, 70 x 300 ft., is to be constructed in Pontiac, Mich., for the Pontiac Foundry Company, which is now taking bids on building and equipment.

Work will be begun some time this summer and machinery provided for an addition to be made to the plant of the Bromwell Brush & Wire Goods Company, at Greensburg, Ind.

The Detroit Auto Specialties Company, which is located at 909 Greenwood avenue, Detroit, will put up a new two-story building, 50 x 75 ft., equipped with light machinery for the manufacture of automobile parts and supplies.

A new building, 60 x 200 ft., one story, is to be erected at Ypsilanti, Mich., for the Michigan Pressed Steel Company. The structural contracts have been let and some equipment provided for.

The Universal Motor Company, Denver, Colo., which has previously been mentioned as looking for a new location, recently purchased ground in the vicinity of New Castle, Ind., and will erect a large new plant.

The Great Lakes Engineering Works, Detroit, whose plans for expansion have already been mentioned, is arranging for the construction of a group of seven buildings to be erected at Ashtabula, Ohio. The details of arrangement and equipment, however, have not yet been fully determined upon.

Contracts are now being awarded and work will proceed at once on one of the new factory buildings provided for in the plans of the Everitt, Metzger, Flanders Company, Detroit, which is to be 70 x 370 ft., four stories. Specifications will also be ready shortly on two buildings of smaller size to be added to the company's Port Huron Works.

Whitehead & Kales of this city have the structural contract for two new shop buildings of large dimensions to be built here for the Glass Enameled Package Company.

A steam turbine set of 1500 kw. will be installed in the power plant of the Reliance Motor Company's new factories at Owosso, Mich., to furnish current for operating a large number of induction motors driving machinery in the shops.

At the recent convention of foundrymen, one of the exhibits which attracted a great deal of attention was the Grimes roll-over molding machine, which is handled by the Detroit Foundry Supply Company of this city. Many of these machines are now in operation in various parts of the country.

The Anderson Forge & Machine Company, which has been erecting a new plant in Detroit, is about to proceed with the construction of a power house to provide current for the electrical operation of its machinery.

A large steel hardening cylinder has recently been added to the equipment of the Grande Brick Company's plant at Grand Rapids, Mich.

It is reported from Sidnaw, Mich., that the factory of William Beitner & Son, which burned there last week, will be rebuilt for larger capacity. The headquarters of the company are at Traverse City, Mich.

The American Sandstone Brick Machinery Company, Saginaw, Mich., has been obliged to crowd its shops to their utmost capacity lately on orders for equipment to be installed in the sand lime brick plants which are now springing up in all parts of the United States and Canada. The requirements of that industry have increased this year at a very rapid rate.

Three tubular boilers of 250 hp. each, a Corliss engine of 500 to 600 hp., generator, electric motors and other power equipment, will be required for the new flooring mill at Gladstone, Mich., work upon which has already been begun by the Northwestern Cooperage & Lumber Company. Much of the machinery needed was recently purchased and more will be added later on as required.

The Advance Pump & Compressor Company, Battle Creek, Mich., is finding an excellent market for centrifugal pumping units in connection with quarries and plants utilizing sand, clay or gravel, owing to the variety of service which they are capable of performing, from the dewatering of pits to the forced circulation of water against high heads, that is frequently found necessary. The pumps are built in vertical or horizontal types, single or multi-stage.

The interests of the Fisher Hydraulic Stone & Machinery Company have been concentrated at Mt. Gilead, Ohio, where shops with modern equipment are being operated.

The additional pumping machinery for water works service at Grand Rapids, Mich., will be purchased in the near future. Specifications can be obtained from the Board of Public Works, which will receive bids until the evening of July 21.

The Means Foundry & Machine Works is completing a new plant in Toronto, Ohio, which will be of considerably larger capacity than the one which has heretofore been operated at Steubenville, Ohio. Some of the machinery used at that place will be utilized in the present location and other modern equipment added.

The Kelsey Wheel Company, Detroit, is erecting additions to its plant to be used for storage room and the manufacture of a line of presses used for the purpose of making balls, cups, brake drums and similar stampings. All necessary machinery has been purchased.

The Hale Motor & Machine Company, Detroit, has been incorporated by S. E. Hale of Cleveland, Ohio, and Chas. Ritter and J. C. Hudson of Detroit. The company has a capital stock of $125,000, and will manufacture motors and auto parts.

The Howse Commercial Car Company, Detroit, has been

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incorporated with a capital of $60,000 to manufacture commercial power trucks. The incorporators are: August J. Stieber, Charles F. Howse and E. P. Newton.

Bradley, Miller & Co., Bay City, Mich., are having plans drawn for a new box factory, which will probably be furnished with electric motor drive throughout.

The Michigan Pressed Steel Company, Detroit, has plans prepared for a one-story factory building, 60 x 200 ft.

The E. J. Kruce Company, Detroit, has awarded a contract for the erection of a two-story machine shop, 50 x 150 ft.

The Cass Motor Truck Company, Port Huron, Mich., recently mentioned, is receiving bids through its architect for the construction of a one-story automobile factory building, 60 x 350 ft.

The Grand Rapids Railway Company, Grand Rapids, Mich., has plans completed and is receiving bids for the construction of new car shops.

The Detroit United Railway Company, Detroit, has in the course of erection an executive building, 62 x 85 ft; new car barns, a washhouse, 52 x 202 ft., and repair shop, 54 x 202 ft. As soon as these buildings are completed there will be erected a number of other buildings, among which will be express and freight offices and sheds and a group of shops for the manufacture, equipment and repair of cars.

The Davidson Mfg. Company, Lenox, Mich., has been incorporated with a capital stock of $35,000. The company will manufacture wood-carved toys and will erect a factory 50 x 100 ft. The officers of the company are George R. Davidson, president; James E. Weter, vice-president; Frank J. Hirt, treasurer, Harles E. Turner, secretary.

Milwaukee

MILWAUKEE, WIS., July 5, 1910.

Continued hot weather, which has been the worst ever known here since Milwaukee became a manufacturing center, demoralized business to such an extent last week that it is impracticable to ascertain just what condition the market for machinery is in at this time. Locally, it is difficult to interest buyers or even to find the people responsible for purchases, as many of them took advantage of the impending holiday to get away to the country for a brief vacation. At the large manufacturing plants, however, orders are reported to be coming in steadily from all parts of the country, and frequent references have been made of late to a brisk foreign trade. In all lines of standard machinery, including shop tools and foundry appliances, conditions seem to be more satisfactory to the makers than to dealers or users. Milling machines, lathes and shapers have been bought so far ahead that, until the large new shops now under construction for leading Milwaukee firms are completed, it will tax their facilities to the utmost to take care of the most desirable class of business. Turret lathes and screw machines can be supplied with reasonable promptness, and there has recently been some good second-hand stock offering. Gear cutters, grinders, polishing machines, pneumatic tools and small apparatus of all kinds can be readily secured, although prices are stiffening. On electric generating sets, motors, controllers, &c., it is becoming increasingly difficult to secure deliveries under 90 days, and for special winding a greater length of time is demanded. Air compressors, except in the larger capacities, are obtainable promptly, and a good many orders for these machines have been placed within the past few weeks. Pumps of every description, hydraulic pressure machinery, accumulators, &c., also fall in the same classification. Heavy traveling cranes, wall cranes, mono-rail conveying systems, hoists, locomotive cranes, derricks, unloading machinery, lifting magnets and all appliances for handling machinery, parts or bulk material, are strongly in demand, and the inquiries received here come from all over the world. Taken as a whole, the situation seems to be full of promise; but the course of the general market is characterized by such irregularity that it will be some time before things are settled down sufficiently to enable any predictions to be made with confidence.

The demand for equipment to be installed by automobile builders and manufacturers of agricultural machinery keeps up to a surprising degree, and there is scarcely a plant here which has not been supplying some of the requirements of these industries. For automobile parts, however, the inquiry seems to be considerably less urgent, and one of the factories here which has been very busy for months past on work of that character is laying off some of its men.

Apparatus used for construction purposes and in allied lines cannot be turned out fast enough to meet the requirements of the various sales agencies in the country, through whom the bulk of the product of plants in this section is placed. Calls for both standard and special machines have been increasing steadily from one month to another, and indications point to a rush of business in the late summer and fall such as the country has never before witnessed.

For saw mill and flour mill outfits, in the manufacture of which many shops in Wisconsin are occupied, there is a marked falling off in the demand, but this condition always occurs during the summer. Planing mills and woodworking plants of all kinds, on the other hand, seem to require more new equipment than ever before, and manufacturers of flour mill machinery are finding a good outlet for their product in cereal factories and other plants in which granular material is pulverized, sifted and bolted.

Among the foundries no lessening in activity is apparent. All continue to be crowded with work and orders seem to be turned down about as frequently as they are accepted. Some of the large manufacturing plants are about to add to their foundry facilities, among them being the Bucyrus Company, South Milwaukee.

The Milwaukee Machine Tool Company is about to conclude the purchase of power equipment for its West Allis plant, including boiler of 80 to 100 hp., engine, dynamo and a number of electric motors.

The Wm. Rahr Sons' Company, Manitowoc, Wis., has secured the site for a new plant, and plans have been ordered drawn.

The Leo Hofmeister Company, Milwaukee, is letting contracts for its new roofing factory in Layton Park, a suburb of this city. The main building will consist of a structure, 118 x 209 ft., with wing, 75 x 118 ft. All of the apparatus required for the present appears to have been provided for.

By an addition now under construction the plant of the R. B. Lange Mfg. Company, Racine, Wis., will be practically doubled in capacity. The new structure is 100 x 250 ft. Machinery has been purchased.

The Wallace Mining Company, Highland, Wis., is adding to its equipment an electric generator and other apparatus of greater capacity than that previously in service.

The principal building of the plant to be erected at Beaver Dam, Wis., for the Beaver Dam Foundry Company, will be 70 x 200 ft., one story, of brick and steel construction. Contracts for the work have just been placed.

Some woodworking and power machinery, including probably electric motors, will be required by the Nelson Lumber Company, Two Rivers, Wis., in consequence of two additions to be erected to their mill. Further particulars are lacking.

The authorities at Brownstown, Wis., have engaged an engineer to prepare plans for an electric power plant. The machinery required will not be of large capacity.

It is reported from Highland, Wis., on the authority of J. H. Lewis of that place, whose information is recognized as possessing uncommon accuracy, that the introduction of electric commercial power in the mining industry of southwestern Wisconsin has already been acknowledged to be of the highest economic value. While the territory now reached from the large generating station of the Interstate Light & Power Company, at Galena, Ill., comprises about 200 square miles, plans have recently been formed for the extension of the service north of Highland, as far as the city of Mineral Point, where current will be supplied to the zinc oxide and acid works, as well as other industries. The Galena station, which now has a capacity of 3000 kw. in General Electric generators driven by engines built in the Allis-Chalmers shops here, will be enlarged at once and the equipment of the various substations strengthened as well as new ones constructed. The reduced cost of operating mining and ore reduction machinery, according to Mr. Lewis, and the cessation of interruptions to service, which were formerly frequent in consequence of power plant breakdowns, are leading nearly all of the companies that have not yet made the change to motor drive to consider doing so. The effect upon the boiler and engine business has already been felt in cancellation of contracts or the breaking off of negotiations that were previously pending. At the same time, the aggregate of machinery purchases is likely to be larger than formerly, due to the ease with which operations can be extended by the use of the more flexible and convenient electric system.

The Wisconsin Bridge & Iron Company, Milwaukee, has taken the contract for structural work on the Wisconsin Motor Mfg. Company's new plant in West Allis, Wis., which will be pushed to completion this summer. The details have been previously reported.

The Pawling & Harnischfeger Company, Milwaukee, is rapidly extending its sales of traveling hoists for the new electric mono-rail system, which was placed on the market some time ago and is now coming into very general favor. In the Northwest it has recently been adopted by some of the largest lumber companies for handling their finished product. By means of the hoist used the operator can from his cage grasp, raise, turn, convey, lower and release a lumber unit without the aid of a ground man. This is due to the fact that the hoist is provided with a turntable having arms or tongs formed into hooks at their lower extremi-

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ties, which take hold of the beams upon which the unit rests. A similar system, but without the turntable and tongs, was installed by this company in the pattern shop and yard of the Allis-Chalmers Works at West Allis, where it has been in service for about eight years. The same application might be made to advantage in any large industrial plant having material which could be handled in this way, including sheet metal.

Construction work has been started on the new mill of C. W. Cheney at Eau Claire, Wis.

A. D. Burnett, Galesville, Wis., has been awarded the contract by the county to construct two steel bridges near Hixton, Wis.

The C. A. Shaler Company, Waupun, is carrying into execution plans made some time ago for the erection of a new two-story factory building, 30 x 130 ft., to be used in the production of the Shaler type of electric vulcanizers, facilities for the manufacture of which have been outgrown. The new structure will be built on the unit system, permitting future expansion without disarrangement of the older parts. A part of the present plant will be used for storage.

It is reported from Eau Claire, Wis., on what appears to be authentic information, that the Northwestern Steel & Iron Works will erect a new foundry building 80 x 200 ft.

A two-story manufacturing building, 70 x 80 ft. or larger, will be completed this summer for the Janesville Batten Mills, Janesville, Wis.

Machinery is being installed in the new shop of the Jefferson Auto Supply Company, Jefferson, Wis., and some work has been started.

The plant formerly operated by the Chicago Excelsior Company at Wausau, Wis., has been sold to Louis Scharbau of that place, who will add to its capacity and install some new machinery.

It is reported from Racine, Wis., that the present wagon factory of the Mitchell-Lewis Motor Company will be leveled, in order to provide for the erection of a modern electrically operated plant in its place. Other contemplated additions and improvements will be carried out in the near future.

The Racine Foundry Company, Racine, Wis., is placing its new plant in operation. A specialty will be made of castings for automobile companies.

The Cleveland Mining Company, Hazel, Green, Wis., is installing a steel head frame at its main shaft and has just placed contracts for pumping machinery, a large two-stage air compressor, drills, &c. The bulk of the equipment is to be furnished by the Galena Iron Works, Galena, Ill.

The Nelson Foundry Company, North Milwaukee, has completed additions to its foundry, doubling the former capacity. A 3-ton hand traveling crane has been added to the foundry equipment and a pattern shop and pattern storage building have also been built.

The Two Rivers Wooden Ware Company, Two Rivers, Wis., is being operated under the direction of a receiver appointed by the court, pending a reconstruction of the company, and is not out of business, as stated in *The Iron Age* of June 23.

The South

CHATTANOOGA, TENN., July 2, 1910.

While some manufacturers and dealers report an excellent demand for nearly all of their products, the average run of trade has fallen off considerably below the standard which was set during the spring months. It is also very irregular. The greater number of orders entered recently developed from inquiries made some time ago, and a considerable percentage comes from districts distant to the principal centers of distribution, where development work is in progress. Railroad buying, which promised for a time to cut quite a figure in the market, has again diminished almost to the vanishing point. The iron and steel companies and allied industries, including mining, yield the most profitable line of orders, and the more important contracts, as well as small single purchases, are pretty well distributed among Southern plants and sales agencies. Phosphate producers, fertilizer works and chemical manufacturers are probably next among the industrial concerns now buying, and their requirements will be an important factor in the situation for at least a number of weeks. Textile mills are also good customers, but their business mostly goes North.

An addition is to be made this summer to the plant of the Chattanooga Plow Company, Chattanooga.

The D. M. Stewart Mfg. Company, Chattanooga, is making a specialty of insulating material for electric power appliances and machinery, which can be furnished in any shape desired.

The purchase of machinery for an electric generating plant and pumping station authorized for construction at Osyka, Miss., is expected to be taken up by the city officials the latter part of this month, following the sale of bonds for the purpose.

A large number of induction motors will be required for driving machinery in the new mill which the Meritas Mills Company is preparing to erect at Columbus, Ga.

A new plant is to be built at Birmingham, Ala., for the Caldwell-Watson Foundry & Machine Company. Provision for electric power will be made throughout.

It is reported from Troy, Ala., that the Standard Chemical & Oil Company will make important improvements in its plant, including the installation of some additional machinery and the partial introduction of motor drive. For the latter purpose an electric generating set will be required.

The Citizens' Light, Heat & Power Company's plant at Montgomery, Ala., has passed under the control of new interests. Additional machinery is to be installed, if the plans of the present owners are carried out, and the service considerably improved. The equipment now includes a battery of Heine water tube boilers and engine driven generating units of about 900 kw. supply current mainly for commercial day load.

Plans have been matured at Louisville, Ky., for a four-story factory building to be erected by the Grisanti Statuary Company. Operating machinery, including electric power equipment and pneumatic appliances, is being provided for.

The machine shop and repair plant of the Alexandria Lumber Company, Ltd., at Pineville, La., recently burned and will need to be replaced. It was equipped for work on locomotives and other rolling stock of a logging railroad as well as for keeping operating machinery in condition.

The Solomon-Norcross Company, Atlanta, Ga., has prepared plans for the improvements of the electric power plant recently purchased by the city of Amory, Miss., which now includes two Triumph generators for direct current driven by engines that were built in the shops of the Hardie-Tynes Mfg. Company, Birmingham, Ala. The present capacity is 150 kw. Pumping machinery for municipal water service will also be installed.

The Berryton Mills, Augusta, Ga., recently incorporated with a capital stock of $150,000, has acquired the property at Racoon, Ga., formerly known as the Racoon Mills. The company has purchased the entire village of Racoon and will change its name to Berryton. About $80,000 worth of new machinery will be required to complete the improvements contemplated.

The Selma Spoke Factory, Selma, Ala., recently incorporated with a capital stock of $10,000, is erecting a plant for the manufacture of spokes for automobile wheels. The company will be under the management of H. E. Masters, its president.

The McNally Pneumatic Gin Corporation, Norfolk, Va., was recently incorporated, with $200,000 capital stock, to manufacture cotton gins. The machines are now being built in Boston and a factory site is being looked for in the South, plans for which have not yet been completed. T. H. Synon is president, J. J. McNally vice-president and M. Denver Synon secretary.

The Northwest

MINNEAPOLIS, MINN., July 2, 1910.

During this month trade is hardly likely to develop any large proportions. Except for municipal buying, which follows in each instance close upon the sales of bonds authorized at recent elections, there is no pronounced support to the market, and current purchases mainly comprise machinery or supplies that are needed for immediate use. Equipment required for the factory buildings or extensions reported during the past few weeks, some of which will not be installed before autumn, has been largely ordered, and what is left includes for the most part standard apparatus that can be taken from stock or supplied on short notice just prior to the time when it will be set up. Much of this class of trade will develop during August and the first part of September.

The property of the Grand Forks Gas & Electric Company, Grand Forks, N. D., which includes a power plant of 1500 kw. capacity, has passed under the control of the H. M. Byllesby Company, Chicago, who are expected to make important improvements.

The plant of the Grangeville Electric Light & Power Company, Grangeville, Idaho, which is equipped with a 300-kw. Bullock generator and a McCormick hydraulic turbine of the S. Morgan Smith Company's manufacture, will be enlarged, having been purchased by a company having other power properties in that section with which it will be jointly managed.

The Gopher Mfg. Company, Minneapolis, which has a good-sized plant here, with sales offices in the Palace Build-

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ing, is being offered inducements to remove to another city, but recently decided to remain at its present location, where additional facilities will probably be provided in the near future. The company manufactures a portable ditching machine.

The equipment of the new municipal power plant at Beach, N. D., recently mentioned, will include a steam boiler of 150 to 200 hp., a cross compound Corliss engine of 150 hp. and an alternating current generator of 100 kw. or larger, together with pumps, heater and other auxiliary apparatus.

The Minneapolis Steel & Machinery Company, Minneapolis, has been awarded the contract for the gas producer plant and engine to be installed in the municipal power station at Tyndall, S. D., and the electrical machinery will be furnished by the Northwestern Electrical Equipment Company, St. Paul.

Charles Leonhardt, who operates a foundry and machine shop in New Ulm, Minn., is considering plans for the erection of a large new building equipped for greater capacity than he now has available.

The most important movement which has thus far been developed to strengthen the position of this city as a manufacturing center appears to have been inaugurated by the Commercial Club of Minneapolis in the appointment of a committee on new industries, which, although but lately formed, has already accomplished results. Not only will new plants be located here, but a systematic effort is to be made to build up and retain the industries already started. Foundries, machine shops, boilermakers and structural iron and steel works will be especially encouraged. The committee is composed of A. E. Zonne, chairman; W. B. Boardman, H. A. Tuttle, E. K. Lower and Wallace G. Nye.

Among local concerns that continue to do a good business, notwithstanding the general midsummer dullness, is the Northern Machinery Company, Minneapolis, which now has a large trade all through this section. Inquiries from the growing cities of the iron ranges in northeastern Minnesota have been particularly numerous.

The Southwest

KANSAS CITY, MO., July 2, 1910.

The feature of the six months ending in June, and one that still characterizes the market more than any other, has been the extraordinary demand for engines, electric generating units, power transmission apparatus and motors for direct machinery drive. For the remainder of the year purchases on this account will probably be even greater, as numerous replacements and extensions of power machinery are contemplated all through the Southwest, in addition to what will be required for new factories and other industrial enterprises that are about to be started.

Other standard lines of equipment are somewhat slow at present, with the possible exception of pumping outfits, crushing plants and mining or ore reduction machinery. For these there is still considerable inquiry, despite the lateness of the season; but shops, foundries, sheet metal works, fabricating plants, &c., have mostly filled their requirements for some time to come, and part of the buying for fall delivery will not be done until later.

The National Lead Company, St. Louis, Mo., whose purchases of power machinery were recently mentioned, has just let the contract for building a one-story factory 100 x 750 ft., which will be among the most modernly equipped of any in the country.

The Fulton Iron Works, St. Louis, recently sold two large, heavy duty engines for shipment to Cuba.

R. K. Papin & Co., Pierce Building, St. Louis, are reported to be in the market for two standard gauge locomotive cranes, one having a 50-ft. boom with fall block and hook, and the other a 40-ft. boom with 1-yard clam shell bucket.

A line of 40 direct current motors will be required by the American Car & Foundry Company for extending electric drive in its plant at St. Charles, Mo. The contract has already been placed.

An automobile plant to supply the company's southwestern trade, which is now very extensive, may be built in San Antonio, Texas, by the Gramm Motor Car Company of Bowling Green and Lima, Ohio. Efforts to secure the industry for San Antonio are now being made by the local Chamber of Commerce.

The authorities at Englewood, Kan., have engaged engineers to prepare plans for a modern system of water works of moderate capacity.

The new plant of the Tucson Iron Works, Tucson, Ariz., is now fully equipped and in operation. One of the specialties of the company will be mining machinery, for which there is an excellent market at present in Arizona and the surrounding districts, including the northern states of Mexico.

The electric generating plant and other property of the Imboden Power & Development Company, Imboden, Ark., has been acquired by interests identified with the local bank and will be enlarged in capacity if present plans are carried out.

A one-story building, 50 x 100 ft., the purpose of which is not stated, will be erected for the W. E. Bohne Machinery Company, Joplin, Mo.

Equipment will be provided shortly for a new stave factory, 60 x 200 ft., to be built at Louisiana, Mo., by the Louisiana Stave & Heading Company.

The generating station of the Roswell Electric Light Company, Roswell, N. M., which has a present capacity of about 500 kw., is reported to have been secured by other interests, with the object of enlarging it and considerably extending the service.

The Arkansas Bridge Company, Fort Smith, Ark., has taken the contract for a large steel bridge connecting that city with Van Buren, Ark.

Machinery for pulverizing will be installed by the Picher Lead Company, Joplin, Mo., in an addition to its plant, 50 x 50 ft., to be completed this summer.

An electric generating set has been installed by the W. B. Baker Company, Heber, Ark., and will be used for lighting service in the plant. Later on additional machinery for motor drive may be needed.

Some pumping machinery of more modern design than that now in service will be required for the municipal plant at Wellington, Kan., where improvements in the water works system have been authorized.

Purchases of machinery for city water works will be made at Miles, Texas, within the next few weeks, following a sale of bonds for the purpose.

The Nevada Water, Light & Traction Company, Nevada, Mo., has acquired the water works, electric light plant, gas works and traction system in that city. The company is planning extensions to its street railway and also for its gas and light service.

The North Pacific Coast

PORTLAND, ORE., July 1, 1910.

Labor troubles are still causing considerable difficulty, with some delay in filling orders taken for machinery or repairs, particularly the latter, although employers are having rather good success in replacing men who have struck. Industrial conditions as a whole, however, are very promising, and the expansion which is visibly taking place along lines of general manufacturing, augurs well for the future of the metal trades, which will be called upon to supply the rapidly growing requirements of the various mills, factories, quarries, crushing plants, logging and mining companies, traction lines, central power stations and the like. From all of these a fair value of business is now being derived. Recently rush repair work has not been easy to place, as some shops feared to take it on because of the likelihood that they would be hindered in its execution, but that condition is now adjusting itself, and the needs of regular customers have not at any time been seriously interfered with. In the line of new building a number of projects recently mentioned are now maturing, and some buying of metal working machinery is being done on this account.

Robbins & Taylor, Portland, Ore., have an interesting exhibit in the photograph of a 96-in. marine engine cylinder from the steamer Charles Spencer. It was broken in two places and put in good condition again by being brazed at the Portland Brazing, Machine & Coppersmith Works, which is now owned and operated by this firm.

A woodworking plant and box factory, the main building of which is 60 x 120 ft., is now being completed by the Nibley-Mimnaugh Company, Wallowa, Ore. A full line of modern machinery has been provided for, but some addional equipment will be required later on.

Plans are reported to have been practically decided upon by the Griffin Wheel Company of Chicago, Ill., for a number of new buildings to be erected on its property at South Tacoma, Wash., and building contracts are being let. Some of the details, however, are still to be worked out. A new foundry is included.

An engine driven generating set of 150 kw., with exciter, switchboard, &c., will be installed in the near future by the Northwestern Woodenware Company, Tacoma, Wash.

The Puget Sound Metal Works, Seattle, Wash., whose plans for rebuilding the plant destroyed by fire were recently referred to, have arranged for its construction and equipment.

The Hofius Steel Company, Seatttle, Wash., will extend its plant this summer and provide for a considerably

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enlarged output, which has been made necessary by the demands upon the business.

The Pacific Electric Engineering Company, Portland, Ore., is making a specialty of electric drive and lighting in industrial plants, for which it furnishes both plans and power equipment, installing the latter complete.

The Whatcom County Railway & Lighting Company, which, in addition to its hydroelectric station near Mount Baker, operates a large steam driven plant in Bellingham, Wash., is replacing the latter with a new power house, which will be equipped for considerably greater capacity.

The Wm. J. Rainey Company, Bellingham, Wash., has just put in service a large new timber cutting plant and planing mill, the machinery for which is all operated by electric motors.

Notwithstanding the fact that some other lines of trade are slack the Hoquiam Machine Works, Hoquiam, Wash., has recently been experiencing a very active demand for the new cast steel block of its manufacture.

The Farther Central West

OMAHA, NEB., July 2, 1910.

From this time until after harvest the machinery trade will be slowing down, as so much attention is being devoted at present to preparations for moving the new crops that all other lines of industry are correspondingly neglected. The hot weather also has a depressing influence upon business in the larger cities, especially in view of the fact that the temperatures have been higher this summer than for many years past. Necessity for enlarged manufacturing facilities at various points is, nevertheless, forcing a certain amount of buying of equipment, and the leading dealers find in each day's mail enough inquiries to keep them reasonably busy. The bulk of the business comes in unsolicited from former customers and there does not appear to be as much shopping around as usual. Negotiations are also apt to be short, direct and more to the point than is ordinarily the case.

The Caldwell-Hallowell Company, Waterloo, Iowa, has let the contract for the erection of a building, 80 x 120 ft., to be used in the manufacture of gasoline engines.

The Waterloo Gasoline Engine Company, Waterloo, Iowa, extension of whose main building has previously been mentioned, is now arranging for two additional structures. The area of the machine shop has been increased to 140 x 300 ft.

The foundry formerly occupied by the Waterloo Gas Engine Company is being enlarged and will be operated in future by the Association Foundry Mfg. Company, Waterloo, Iowa, which represents some of the interests that are making the city an important manufacturing center. Local work will alone be sufficient to keep the plant very busy.

The authorities at Wymore, Neb., have under consideration the installation of two motor driven pumps of the type manufactured by the Goulds Mfg. Company, Seneca Falls, N. Y., from whom the equipment will probably be purchased.

In order to provide for the growth of its business, which has necessitated extension of manufacturing facilities, the Iowa Malleable Iron Company, Fairfield, Iowa, has increased its capital to $200,000.

The Des Moines Electric Company, Des Moines, Iowa, is about to let contracts for the building and equipment of a power transformer substation.

The Ritchie Corrugated Culvert Company, Muscatine, Iowa, will build a plant in South Muscatine.

The Iowa Portland Cement Company, Des Moines, Iowa, which put a new plant in operation some weeks ago, is adding a number of electric motors for machinery drive.

Contracts have been placed for the construction of a new municipal power and lighting plant at Paullina, Iowa, and equipment purchased.

It is reported from Mason City, Iowa, that the Lehigh Portland Cement Company will establish a plant there with capacity of 2500 barrels daily, to be electrically operated. The headquarters of the company mentioned are at Allentown, Pa.

Negotiations are to be opened by the city of Fairbury, Neb., for the purchase of the 300 kw. electric power plant of the Fairbury Light & Water Company, failing which the construction of a municipal station will be entered upon.

The Oskaloosa Traction & Light Company, Oskaloosa, Iowa, which operates a battery of Stirling boilers of 1000 hp., furnished by the Babcock & Wilcox Company, will soon arrange for adding another unit of 250 hp. and some auxiliary apparatus. An extension of the power house is to be built in order to provide for the increased capacity needed.

The installation of one or more motor driven centrifugal pumps has been practicaly decided upon for the municipal water works to be constructed at Murray, Utah, and the authorities are considering plans for a hydro-electric plant to provide the necessary power for operating the station.

The Des Moines Bridge & Iron Works, Des Moines, Iowa, has been awarded the contract for an elevated steel tank and tower, to be erected in connection with the new municipal water system at El Centro, Cal. An interesting feature of the complete installation is the fact that the pumps will be driven by distillate engines built in one of the shops on the Coast.

Government Purchases

WASHINGTON, D. C., July 5, 1910.

R. C. Holliday, chief of Bureau of Yards and Docks, Navy Department, Washington, D. C., will open bids July 16 for two 100-kw. synchronous motor generator sets, one 2½-kw. booster set and switchboard controlling equipment.

The Isthmian Canal Commission, under circular 593, will open bids July 19 for steam traps, engine indicators and a general lot of shop supplies.

The Lighthouse Board, Washington D. C., opened bids June 27 for two Scotch boilers complete with uptakes, smokestacks and boiler mountings, to be delivered at the Lighthouse Depot, Lazaretto Point, Md., as follows: William Cramp & Sons Ship & Engine Building Company, Philadelphia, Pa., $12,435; John Mohr & Sons, Chicago, Ill., $11,640; Newport News Shipbuilding Company, Newport News, Va., $11,985; Springfield Boiler Works, New York, $10,873.

The Isthmian Canal Commission, Washington, D. C., opened bids under circular 589, June 28, for the following:

Class 12.—One universal milling machine—Bidder 79, Herron, Ricard & McCone, San Francisco, Cal., $2880; 140, Pacific Tool & Supply Company, San Francisco, Cal., $2863.12.

Class 13.—One vertical milling machine—Bidder 79, Herron, Ricard & McCone, San Francisco, Cal., $2550.

Class 31.—Two motor driven centrifugal drainage pumps—Bidder 27, Buffalo Steam Pump Works, Buffalo, N. Y., $366.50; 80, Hallidie Machinery Company, Seattle, Wash., $349; 114, Manning, Maxwell & Moore, New York, $342; 142, Perine Machinery Company, Seattle, Wash., $286; 195, Watson-Stillman Company, New York, $395; 201, H. R. Worthington, New York, $475 and $425.

Class 81.—One standard gauge compressed air locomotive, one accumulator and supplying, installing and testing outside pipe line and charging stations—Bidder 117, McCay Engineering Company, Baltimore, Md., $22,700; 137, H. K. Porter Company, Pittsburgh, Pa., $15,080.

Class 101.—One universal turret lathe—Bidder 73, Gisholt Machine Company, Madison, Wis., $2620, $2675 and $2890; 196, Warner & Swazey Company, Cleveland, Ohio, $2125.

The Bureau of Supplies and Accounts, Navy Department, Washington, will open bids July 19, under schedule 2675, for five generators, and 2672, for a miscellaneous lot of air driven drilling machines and hammers. On July 26 bids will be opened, under 2693, for two transmitters and indicators for the Brooklyn Navy Yard, and on August 16, schedule 2695, one steam hammer; 2696, one water tube boiler, for the Mare Island, Cal., station.

A New Dodge Warehouse.—It will not be long until the Dodge Mfg. Company will be storing pulleys, hangers, clutches, bearings and other stock goods in its new warehouse at Mishawaka, Ind. Work is progressing with speed. Already the first floor has been passed and material is being laid for the second. The completed structure will be one of the most modern in the country. Reinforced concrete is being used entirely, with Fenestra steel windows, thus insuring against fire. The plans call for four stories and a basement, the length being 256 ft. and the width 112 ft. Besides its use as a place for storage, excellent facilities will be provided for the rapid crating of goods. Along one side and one end a loading platform has been built where cars can be filled without delay and hurried to the Lake Shore & Michigan Southern Railroad by ample trackage for immediate delivery to customers.

Lake Superior Mining Institute.—For its 1910 meeting the Lake Superior Mining Institute will make its headquarters at Ironwood, Mich. The meeting begins Wednesday, August 24, and there will be alternations of excursions to Gogebic Range mines and sessions for reading papers, the meeting closing on Friday. An invitation has been accepted to visit the Gary Ind., plant of the Indiana Steel Company after adjournment at Ironwood.

A Standard Gauge for Sheets and Plates

Congressman W. P. Borland, who represents the Kansas City district in the House of Representatives, on June 23 introduced a bill embodying the views of Western jobbers relative to a uniform gauge for iron and steel sheets and plates. The text of the bill (H. R. 27,140), which was referred to the Committee on Interstate and Foreign Commerce, is as follows:

A Bill Establishing a Standard Gauge for Sheet and Plate Iron and Steel

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That for the purpose of securing uniformity the following is hereby established as the only standard gauge for sheet and plate iron and steel in the District of Columbia and in all the Territories and possessions of the United States; and for all sales and shipments into any State, Territory, District, or possession of the United States from any other State, Territory, District, or possession of the United States, or to any foreign country, and for all sales to the United States or for its use, namely:

Number of gauge.	Approximate thickness in fractions of an inch.	Approximate thickness in decimal parts of an inch.	Approximate thickness in millimeters.	Weight per square foot in ounces avoirdupois.	Weight per square foot in pounds avoirdupois.	Weight per square foot in kilograms.	Weight per square meter in kilograms.	Weight per square meter in pounds avoirdupois.
0000000	1-2	0.5	12.7	320	20.00	9.072	97.65	215.28
000000	15-32	0.46875	11.90625	300	18.75	8.505	91.55	201.82
00000	7-16	0.4375	11.1125	280	17.50	7.983	85.44	188.37
0000	13-32	0.40625	10.31875	260	16.25	7.371	79.33	174.91
000	3-8	0.375	9.525	240	15	6.804	73.24	161.46
00	11-32	0.34375	8.73125	220	13.75	6.237	67.13	148.00
0	5-16	0.3125	7.9375	200	12.50	5.67	61.03	134.55
1	9-32	0.28125	7.14375	180	11.25	5.103	54.93	121.09
2	17-64	0.265625	6.746875	170	10.625	4.819	51.88	114.37
3	1-4	0.25	6.35	160	10	4.536	48.82	107.64
4	15-64	0.234375	5.953125	150	9.375	4.252	45.77	100.91
5	7-32	0.21875	5.55625	140	8.75	3.969	42.72	94.18
6	13-64	0.203125	5.159375	130	8.125	3.685	39.67	87.45
7	3-16	0.1875	4.7625	120	7.5	3.402	36.62	80.72
8	11-64	0.171875	4.365625	110	6.875	3.118	33.57	74.00
9	5-32	0.15625	3.96875	100	6.25	2.835	30.52	67.27
10	9-64	0.140625	3.571875	90	5.625	2.552	27.46	60.55
11	1-8	0.125	3.175	80	5	2.268	24.41	53.82
12	7-64	0.109375	2.778125	70	4.375	1.984	21.36	47.09
13	3-32	0.09375	2.38125	60	3.75	1.701	18.31	40.36
14	5-64	0.078125	1.984375	50	3.125	1.417	15.26	33.64
15	9-128	0.0703125	1.7859375	45	2.8125	1.276	13.73	30.27
16	1-16	0.0625	1.5875	40	2.5	1.134	12.21	26.91
17	9-160	0.05625	1.42875	36	2.25	1.021	10.99	24.22
18	1-20	0.05	1.27	32	2	0.9072	9.765	21.53
19	7-160	0.04375	1.11125	28	1.75	0.7938	8.544	18.84
20	3-80	0.0375	0.9525	24	1.50	0.6804	7.324	16.15
21	11-320	0.034375	0.873125	22	1.375	0.6237	6.713	14.80
22	1-32	0.03125	0.793750	20	1.25	0.567	6.103	13.46
23	9-320	0.028125	0.714375	18	1.125	0.5103	5.493	12.11
24	1-40	0.025	0.635	16	1	0.4536	4.882	10.76
25	7-320	0.021875	0.555625	14	0.875	0.3969	4.272	9.42
26	3-160	0.01875	0.47625	12	0.75	0.3402	3.662	8.07
27	11-640	0.0171875	0.4365625	11	0.6875	0.3119	3.357	7.40
28	1-64	0.015625	0.396875	10	0.625	0.2835	3.052	6.73
29	9-640	0.0140625	0.3571875	9	0.5625	0.2551	2.746	6.05
30	1-80	0.0125	0.3175	8	0.5	0.2268	2.441	5.38
31	7-640	0.0109375	0.2778125	7	0.4375	0.1984	2.136	4.71
32	13-1280	0.01015625	0.25796875	6½	0.40625	0.1843	1.983	4.37
33	3-320	0.009375	0.238125	6	0.375	0.1701	1.831	4.04
34	11-1280	0.00859375	0.21828125	5½	0.34375	0.1559	1.678	3.70
35	5-640	0.0078125	0.1984375	5	0.3125	0.1417	1.526	3.36
36	9-1280	0.00703125	0.17859375	4½	0.28125	0.1276	1.373	3.03
37	17-2560	0.006640625	0.168671875	4¼	0.265625	0.1205	1.297	2.87
38	1-160	0.00625	0.15875	4	0.25	0.1134	1.221	2.69

Sec. 2. That it shall be unlawful for any person in the District of Columbia or in any Territory or possession of the United States to sell or offer to sell, deliver or offer to deliver, in fulfillment of any contract of sale, any sheet or plate iron or steel of any other gauge than that hereby established.

Sec. 3. That it shall be unlawful for any person to sell or offer to sell, deliver or offer to deliver, in fulfillment of any contract of sale, any sheet or plate iron or steel to the United States or to any person for its use by any other gauge than that hereby established.

Sec. 4. That it shall be unlawful for any person by any communication sent by mail, telegraph or otherwise, from one State, Territory, District or possession of the United States to any other State, Territory, District or possession of the United States, or to any foreign country, to sell or offer to sell any sheet or plate iron or steel by any other gauge than that hereby established.

Sec. 5. That it shall be unlawful for any person to transport or deliver for transportation, or offer to transport or deliver for transportation from one State, Territory, District or possession of the United States to any other State, Territory, District or possession of the United States, or to any foreign country, any sheet or plate iron or steel which shall be sold, measured, gauged or designated by any other gauge than that hereby established.

Sec. 6. That in the practical use and application of the standard gauge hereby established a variation of two and one-half per centum either way may be allowed.

Sec. 7. That any person who shall violate any of the provisions of any of the foregoing sections shall be guilty of a misdemeanor, for each offense shall, upon conviction thereof, be fined not to exceed five hundred dollars, or shall be sentenced to one year's imprisonment, or both such fine and imprisonment, in the discretion of the court. And for each subsequent offense and conviction thereof shall be fined not less than one thousand dollars, or sentenced to one year's imprisonment, or both such fine and imprisonment, in the discretion of the court.

Sec. 8. That in construing and enforcing the provisions of this act, the act or omission or failure of any officer, agent, or other person acting for, or employed by, any corporation, company, society or association, within the scope of his employment or office, shall in every case also be deemed to be the act, omission or failure of such corporation, company, society or association, as well as that of the person.

The Twichell Iron Company, Kansas City, Mo., states that the object of this bill is to prevent misrepresentation and to check the substitution of other gauges for those which have been agreed to be delivered. Copies of the bill are to be presented to the different hardware and sheet metal associations for their endorsement. The prospects of getting the bill passed depend on how widespread the interest in it may prove to be. The Twichell Iron Company expresses strong belief in the necessity of this legislation.

A New Factory for San Antonio.—The Commercial Motor Car Company, San Antonio, Texas, organized with a capital stock of $150,000, began operations June 15. It has purchased a desirable site for a factory in that city and will erect a reinforced concrete building which is to be equipped with the most approved machinery for manufacturing and assembling commercial auto trucks. This is claimed to be the first institution of its kind in the South. The company expects that the business will be highly profitable, as the demand for the class of vehicle to be made assures the plant a satisfactory trade in motor trucks for both light and heavy hauling, which are to be the company's specialties. Z. Z. Brandon is president and L. J. Brandon is secretary and treasurer. The office will be located in the Book Building until the factory is ready for occupancy.

The International Congress of Mining, Metallurgy and Practical Geology

The Great Meeting at Duesseldorf, Germany, June 20 to 23

BY CHARLES KIRCHHOFF.

It was an extraordinary gathering of eminent European mining engineers, metallurgists and geologists which assembled at Duesseldorf on the Rhine to participate in the proceedings of the fifth "International Congress for Mining, Metallurgy, Applied Mechanics and Practical Geology," to give it its full title. The invitation to meet at Duesseldorf was issued by a group of five associations, both local and national in their range of interests, being the Verein fuer die bergbaulichen Interessen in Oberbergamtsbezirk Dortmund, the Mining Association of the Dortmund district, the Verein deutscher Eisenhuettenleute, the national society of German iron metallurgists, the Verein deutscher Eisen und Stahlindustriellen, the national society of German iron masters, the Verein deutscher Maschinenbau-Anstalten, the national society of builders' machinery, and the Stahlverband, the German steel syndicate. Rather to the surprise of the hosts, the invitation was accepted by no less than 1762 members of the societies and representatives of foreign governments, 634 foreigners being included in the list. The participation on the part of the United States was unfortunately very small. E. W. Parker of the United States Geological Survey, being prevented from sailing at the last moment, while Prof. J. W. Richards of South Bethlehem, Pa., and C. W. Baker, editor of *Engineering News*, were delayed by the extraordinary fog in the channel.

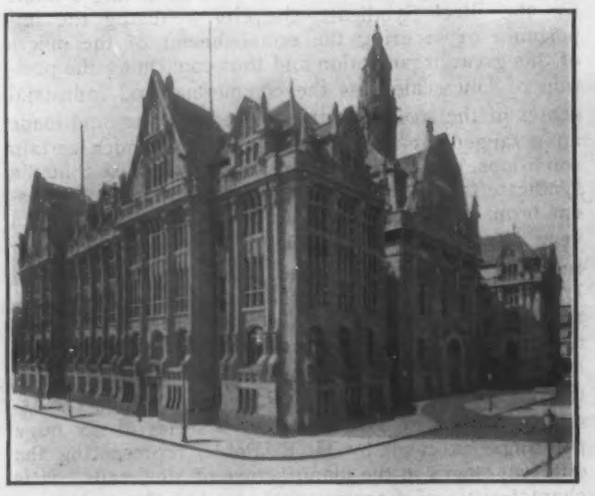
The very large attendance taxed the facilities of Duesseldorf, in spite of its usually ample and satisfactory accommodations, to the point of leading to the temporary assignment of bathrooms, in individual cases, as lodging rooms.

Admirable Arrangements Made

In spite of the rush, so admirable were the arrangements, so thorough the preparations, and so clever the management that the crowded programme was carried through without a hitch. The writer happens to know that this was not accomplished without extraordinary and sustained efforts, a corps of 30 men being engaged all night on the eve of the Congress in perfecting the final details.

The credit for the success is due primarily to Dr. E. Schroedter, the genial and tactful secretary of the German society of iron and steel metallurgists, and the editor in chief of *Stahl und Eisen* and his associates. The temporary organization, which was subsequently elected by the Congress as the permanent organization, consisted of Edward Kleine of Dortmund, prominently identified with the great coal mining industry of the district, and F. Springorum, the general manager of the Hoesch Steel Works at Dortmund, one of the leaders of the steel industry. The secretaries were H. von und zer Loewenstein of Essen, the secretary of the local coal interests, and Dr. Schroedter. The treasurer was Dr. Schaltenbrand, the general manager of the German Steel Syndicate, whose unusual linguistic abilities were freely drawn upon to summarize offhand in English or French for the benefit of foreigners the speeches and addresses made in German. The three languages were the ones accepted as official, and it was surprising how freely they were used and generally understood.

By far the greater number of the papers were available in full, with their accompanying illustrations, in the language of the author, in itself a feat in management which those familiar with even small conventions will appreciate. The climax, however, was capped by the fact that there were placed in the hands of the delegates in advance well prepared abstracts of practically all of the papers in the three languages printed in parallel columns. Besides there was a wealth of literature available in the form of guide books, maps, &c., to which was added a neat daily Congress journal, in three languages. Your correspondent is inclined to dwell upon these features because they show what efforts are put forward to anticipate the desires of delegates at such conventions which seem to him to be approaching the point where even with the best of effort they threaten to become unmanageable.



The Steel Syndicate's Building at Duesseldorf, Germany.

The City of Duesseldorf

A few words may be said of Duesseldorf itself. It combines to an extraordinary degree the features to make it an ideal convention city, and be it added leaves no stone unturned, as one feature of far reaching municipal enterprise to secure representative gatherings. No American boom town could outdo it in aggressive enterprise and none could match it in long headed, liberal, many-sided development. A little fishing settlement in the twelfth century, it became the headquarters of different feudal lords, but it was not until the second half of the eighteenth century that it became important, one interesting event being the establishment of the Painters' Academy in 1767. Later under the administration of Peter Cornelius, Schador and the Achenbachs it became one of the great art centers of Germany, and while it has in recent decades divided the honors with other cities, there still remains a devotion to and appreciatiou of art which greatly adds to its charm to the traveler.

Duesseldorf boasts above all of being a "garden city," some of its old moats and feudal gardens having been converted into a series of connected public parks, with splendid trees and lawns, statuary and fountains.

Upon its past of a court residence and an art center, whose population in 1880 did not reach 100,000, there has been built up without sacrificing its early charms and even much enhancing them, a great industrial and commercial center, whose population has risen to 350,000. Much of this of course is due to the tremendous development during the past 30 years of the coal mining, iron and steel and allied industries, but it has not been accomplished without a good deal of hustling and even more of farsighted investment of heavy sums of money.

Some of the many feats accomplished by the management of the city may be cited as an example. A private company undertook to develop a tract of land on the opposite bank of the Rhine and an old ferry was supplanted by an exceedingly handsome bridge. Later on the town acquired the property, used the material for preparing the ground on which the great exhibition of 1902 was located, and which, by the way, besides being a gem in its way, proved a commercial success. The principal building, an imposing structure, was built to stay, and is now used for frequent exhibitions of fine arts. The city, by donating the ground, induced the state to build near by, also facing the Rhine, a very large and handsome courthouse, and the offices of the Royal Government.

The Steel Syndicate's Building

When the question came up of establishing a home for the Steel Syndicate, the city, realizing the importance of securing the establishment of the offices of this great organization and thus confirming the position of Duesseldorf as the commercial and industrial center of the steel industry, offered the site, and made an arrangement under which the city, under certain conditions, takes over the building, in the case that the syndicate is not renewed at the expiration of its present term. The building is an ornate structure, with a very attractive tower; is very large, accommodating fully the 400 employees who, under the leadership of Dr. Schaltenbrand, handle the entire selling and management of the products of the Steel Syndicate. There are very fine assembly and committee rooms, elegant but dignified in their appointments, and the offices of the officers and their staffs. The stairway and the assembly room will be adorned by a series of six huge paintings, executed by H. E. Pohle, representing the different stages in the manufacture of steel rails. It is characteristic of German methods that the artist and representatives of the Steel Syndicate spent weeks traveling among the mines, coke ovens, furnaces and mills, taking photographs and making observations, so that the pictures should be truthful in all their technical details, as well as representing, from an artistic point of view, the glories of the industry. The writer commented on the fact that, contrary to the usual conception of the artist portraying industrial work, the pictures were not crowded with men in attitudes approaching muscular agony, and was told that it was the distinct purpose to convey to the layman the fact that the brawny Vulcan has given way to the worker, usually in an attitude of rest, watching the operations of the machinery and guiding it in doing its well defined duty.

The fact may be added, as another instance of canny advertising, that four of these pictures form the "close" of the exhibition of the syndicate at Buenos Aires, where they attract and give interest to what would otherwise be the usual pile of heavy steel products, which means so little to the casual visitor to exhibitions, and seems to render, usually, such exhibitions a pure waste of money to the steel producer.

Duesseldorf has prospered greatly, which is shown by the fact that the total state income tax levied, which in 1892 amounted to 1,500,000 marks, rose to 5,900,000 marks in 1909. The local taxes in German cities are based on the state income tax, and these in Duesseldorf are much lower than they are in other industrial cities in the district. They are 145 per cent. for the city, while they are 200 or double for Essen and Duisburg, 210 for Dortmund, 230 for Barmen, 155 for Cologne and 177 for Aix-la-Chapelle. The city harbors 16,000 firms, who employ 120,000 persons, the chief industry being that of iron and steel, and the building of machinery.

(To Be Continued.)

The Superior Steel Company's Improvements

The Superior Steel Company, whose plant is at Carnegie, Pa., near Pittsburgh, recently placed in operation its new 12-in. double cold mill, which is giving entire satisfaction. The mill was built by the A. Garrison Foundry Company, Pittsburgh, and includes gearing and countershaft; it has three stands of 12 x 18-in. cold rolls on either side of the gearing. An Erie City high-speed improved Lentz valve engine drives the mill. This engine and some other equipment necessitated the installation of 800-hp. water tube boilers in the old power house.

The company has also contracted with the A. Garrison Foundry Company for a hot mill that will consist of a 20-in. roughing train, three 14-in. intermediate and part continuous trains, and one 14-in. finishing train; all are to be driven by rope sheaves with the exception of the finishing train, which will be driven through direct connection by Porter-Allen high speed mill engines, built by the Southwark Foundry & Machine Company, Philadelphia. This mill will be installed in a new building, 80 x 350 ft., the steel for which is being furnished and erected by the McClintic-Marshall Construction Company, Pittsburgh. A new continuous heating furnace of the Alex Laughlin type, 1600-hp. Erie City water tube boilers and a new Pawling & Harnischfeger electric traveling crane are to be added. It is expected this mill will be installed and ready for operation about September 1.

The Superior Steel Company now has the largest cold-rolled strip steel plant in the country. It recently installed a complete narrow gauge industrial system of the Orenstein-Arther Koppel Company type, which includes two electric locomotives and 36 steel cars. Some time ago a crane runway 75 ft. wide and several hundred feet long was erected in the billet yard. This is also served by a Pawling & Harnischfeger electric crane. The Dravo Contracting Company, Pittsburgh, is extending the company's water works system. A concrete pumping station 16 x 33 ft. is being built, in which two De Laval electric centrifugal pumps are to be installed, while provision has been made for a third. The pumps are designed to operate at 1150 rev. per min. against a head of 70 ft., having a rated capacity of 5250 gal. per min. Water will be taken from Chartiers Creek and pumped into a Scaife water softening plant. The pump station will likely be completed by August 1. These improvements recently made and others undergoing construction cost about $300,000, and bring the Superior Steel Company's plant up to the highest state of efficiency. About a year ago it installed a 20-in. continuous mill for rolling large sizes of bars. This was also built by the A. Garrison Foundry Company and it is driven by a Reese piston valve engine. A number of shears and some special machinery for handling cold rolled material have also been installed for the company by the A. Garrison Foundry Company.

The Boston Gear Works, Frank Burgess, Norfolk Downs, Mass., whose factory was completely burned last November, has built a new plant which is now running night and day.

The Centennial of the First Rolling of Boiler Plate in the United States

Many representatives of the iron and steel trades participated in a double centennial celebration at Coatesville, Pa., on Saturday, July 2—that commemorating the occupation of the present site of the Lukens Iron & Steel Company's works on the Brandywine Creek by Isaac Pennock, the founder of the Lukens plant, on July 2, 1810, and that celebrating the making of the first boiler plate in America, in the old Brandywine Mill, under the direction of the forefathers of the present operators of the Lukens works. The occasion was also made noteworthy by the marking of the site of what has been known as the "Old Mill" with a bronze tablet, placed by the Chester County Historical Society.

The out of town guests were met by automobiles on the arrival of the various trains and taken to the offices of the Lukens Iron & Steel Company, where they were informally welcomed. Later luncheon was served on the lawn of "Gray Stone," the residence of President A. F. Lukens. At 2 o'clock a parade of the employees of the Lukens works was formed, which passed in review before the officers of the company and assembled guests, thence passing through the principal streets of the town and marching to a meadow on the banks of the Brandywine, near the Lukens works. Here the exercises of the afternoon were held, under the direction of George Morris Philips, president of the Historical Society. After Charles Lukens Huston had invoked divine blessing an address of welcome was made by Dr. Philips. He referred to the way in which the Chester County Historical Society, which had prepared the tablet for the site of the old Lukens mill, as shown in *The Iron Age* of June 30, was performing similar service at other historic spots in Chester County.

At Coventryville, in the northern part of the county, it is marking the site of Coventry Forge, started in 1717, the first forge in Chester County, and the second in Pennsylvania, at which Mordecai Lincoln, the great-great-grandfather of Abraham Lincoln, worked as a blacksmith, and in which he was a partner. A few miles further west, in Warwick township, the society is marking Warwick Furnace, built in 1737, where the Franklin stoves were first made, and where cannons and cannon balls were made for the use of the Americans in the Revolutionary War. At Phœnixville, Coatesville's only rival in the county as an iron town, the society dedicates this week a bronze tablet on the site of the rolling mill where in 1783 the first iron was rolled in Phœnixville.

An Address by John Fritz

Dr. Philips introduced John Fritz, the grand old man of the steel industry, who responded with reminiscences of the iron industry. Mr. Fritz said in part:

The reputation of the Lukens firm was thoroughly established many, many years before my connection with the iron business; but there is one unparalleled and pleasant feature in this record—the length of time the works have remained in one family.

EARLY EXPERIENCES WITH PUDDLE MILLS.

The first puddling furnace in this country was built at Plumsock, near Brownsville, Fayette County, Pa., in 1817. On Redstone Creek, in 1817, a flood caused its partial destruction and the machinery was subsequently removed to Brownsville. In 1819 a rolling mill was built at Pittsburgh containing four puddling furnaces. This was accidentally blown up and the machinery was taken to Covington, Ky. Both enterprises thus seem to have ended in disastrous failures. From 1817 to 1836 but little progress was made in the way of marked improvement. In the years 1844-1845 the manufacture of rails commenced. This at once gave puddling the leading position in the manufacture of iron, which it maintained until the introduction of the Bessemer process.

At this time the manufacturers' troubles began. The demand for puddlers soon exceeded the supply and they thought it might be well for them to have things their own way. Hence the troubles commenced, and bitter they were. At that time the Welsh hammer was the only way in use to put the puddled ball in shape for the rolls. Then the crocodile squeezer came into use, next the Winslow squeezer. All of them were incapable of doing the work properly and in quantity. Next and last came the Burden squeezer, the introduction of which caused the bitterest strike I ever witnessed. As I at this time recollect there was but one Burden squeezer put in that did not cause a strike. This was at Cambria, and there was a little strategy practiced which at that time was highly essential.

After a time the puddlers became reconciled to the use of the squeezer and it came into general use, and is to this day as nearly perfect a machine for the purpose intended as has been devised. It is simple in its construction, does its work in a perfect manner and establishes justice between the ironmaster and the workman from which there is no appeal, and, in the end, it became the puddler's friend.

About the year 1848 boiling came into general use. This was a great improvement, and puddling soon became the all important branch of the great iron industry of the country and continued in the lead until it was overtaken by the almost magical invention of Sir Henry Bessemer.

EARLY BLAST FURNACE PRACTICE.

Until about the year 1840, practically speaking, all the iron product of the United States was made with charcoal. My first connection with the blast furnace was in 1839. It was set against the hills so that the ore, charcoal and limestone could be delivered on a level with the tunnel head to save hoisting. The blast was made by water power, the blowing cylinder was made of wood, and was driven by a wooden beam, which was connected to the crank on the end of the water wheel shaft by a connecting rod. I was sent to this furnace as a cub to put up what was called a belly pipe, which was made at the shop. I was learning my trade. When it was put in place it did not reach the tuyere by some 6 or 7 in., and I suppose some mistake had been made in the length. The man in charge, founder as he was called, opened his hand and placed his thumb at the end of the pipe and opened his finger at the opening for the tuyere and said it was just right. The pipe was connected to the main pipe by a short leather connection so it could be swung out of the way to get the cinder out. The general condition of the furnaces was very crude until 1840, when David Thomas, since affectionately called "Father Thomas," made the first anthracite iron in a commercial way that was made in this country.

THE EVOLUTION OF THE ROLLING MILL.

In 1824 the rolling mills were in a very crude condition and there was no marked improvement in them until the manufacture of rails commenced. But even at this time the plan of the mills and the manner of building them practically remained the same. The mills were geared. The general impression of the rolling mill proprietors seemed to be the more wheels they could get in the better the mill. Up to this time the carpenter or millwright had largely to say; consequently wood was much used, the shafts were generally made square and the flywheel and the gear wheels were secured on them by wooden wedges into which thin wedges of iron were driven. After the manufacture of rails commenced a more rigid and better workmanship was required. The millwright and carpenter were superseded by the machinist; the shafts were now turned up and the wheels bored out and the mill all fitted in a more workmanlike manner.

From 1845 to 1856 there were but few improvements made either in machinery or in the manner of rolling except in the introduction of the rail straightening machine, which took the place of the 60-lb. sledge and a special man to handle it. When he wanted to rest the works came to a standstill until such time as he was completely rested, sobered up or restored to health, as the case might be.

INTRODUCTION OF THE THREE-HIGH MILL.

The year 1857 is a memorable period in the history of the manufacture of iron. Up to this time all the rails were rolled on a two-high mill, a most crude and unscientific manner of rolling iron, especially rails, they being passed back over the rolls, the metal cooling, and as the rail was formed the flange became thinner and cooled more rapidly, and consequently it was much more liable to crack and tear up. In the three-high mill the tendency to crack or tear the flanges is greatly reduced from the fact that in passing through the rolls in the opposite direction, any

crack or tear that may occur is rolled down instead of being increased as in the two-high mill, in which it frequently happened that the flange tore off the whole length of the rail, winding around the roll and forming what was called a collar, and at times breaking the roll. Besides the greatly increased quantity that could be made in a given time, the quality was greatly improved and the criminal practice of patching rails, which were liable to break in the track, killing people, destroying property and delaying traffic, was completely abandoned. This alone in the days of iron rails made the improvement invaluable. But the traveling people at large knew nothing of the danger they were constantly exposed to when on a train.

[Mr. Fritz then gave at some length the now familiar story of his introduction of the three-high mill at Johnstown, Pa.]

THE NATION'S GREAT DEBT TO BESSEMER STEEL.

The Hon. Abram S. Hewitt, in replying to the presentation to him in 1890 of the Bessemer medal by the Iron and Steel Institute of Great Britain, speaking of the Bessemer process, stated that a striking effect of this invention was that it furnished us the means of paying off our national debt. He showed that the cheapening in the cost of transportation enabled us to increase enormously the sales of food products in foreign markets, and our imports of foreign merchandise were correspondingly increased. From these imports a revenue was derived enabling the country to reduce the national debt in 25 years from about four thousand millions of dollars to less than nine hundred millions of dollars in 1890.

When I was a boy of ten years old, I read a speech made by Thomas F. Benton of Missouri, in which he said that if he had his way he would build a great national highway from the Atlantic to the Pacific oceans, and on the highest peak of the Rocky Mountains he would erect a colossal statue of Christopher Columbus, with the right hand extended as if saying, "There is the way to India." As I grew up and railroads came into general use, I believed it would be practicable to build one across the mountains, but I did not expect to make the rails for it, which I did, and it was the introduction of steel rails that made it possible. Now I have lived to see five or six transcontinental lines built and we are trying to get more. Were they to undertake to build a railroad from the Atlantic to the Pacific and start at the Atlantic end, using iron rails such as used to be made, and using 150-ton locomotives and cars carrying 50 tons of freight, the rails on the Atlantic end of the line would be worn out before the Pacific would be reached.

It is to the invention, introduction and perfection of the modern system of steelmaking in this country that we are indebted for the education of our people in the scientific, mechanical and metallurgical arts, enabling them to erect such manufacturing plants as were necessary to supply our Government with the sinews of war, and thus making it possible to achieve those glorious victories which at once placed us in the front rank among the nations of the earth.

History of the Company and of Iron Making in Chester County

A. F. Huston, president of the Lukens Iron & Steel Company, followed with an address, reviewing the history of the company from the time its founder, Isaac Pennock, established the Federal Slitting Mill at Rokeby, on Buck River, Chester County, in 1780, to the erection of what was known as "the Old Mill" on the Brandywine Creek, the site of the present Lukens plant, in 1810, and the development of the same in later years. This history in detail was given with illustrations in *The Iron Age* June 30, 1910, pages 1562 to 1567.

Ex-Governor Samuel W. Pennypacker, president of the Historical Society of the State of Pennsylvania, made an interesting address on "The Early Iron Industry in Chester County." He said that early iron making in Pennsylvania began along the Schuylkill River. The first authentic manufacture was in 1717, when Rutter & Potts began the manufacture at Colebrookdale. In 1718 Samuel Matt established the Coventry Forge in Chester County, so that the county ranks second in the manufacture of iron in eastern Pennsylvania. In 1736 iron making was engaged in at Pottstown at Warwick furnace, where many of the early stoves were made. Here also were cast cannon and balls for use in the Revolutionary War. About 1740 an iron plant was located at Valley Forge, on the Schuylkill River, operated originally under the name Mount Joy Forge, but later changed to the Valley Forge, from which that historic locality takes its name.

The speaker referred particularly to the elaborate ornamentation on iron implements and castings in the early days. While the castings and tools were crude in manufacture the ornamentation was quite artistic. Steel making was engaged in at Coventry at a much earlier date than that claimed for its manufacture in Connecticut.

Congressman Thomas S. Butler followed with a brief address congratulating the Lukens management on its long and successful career, and wished it continued success.

At the close of Congressman Butler's address the assembled guests proceeded to the Chemical Laboratory of the Lukens Works, which stands on the site of the old mill. On a granite column against this building the bronze tablet commemorating the making of boiler plate was placed. After brief remarks by Dr. Philips the unveiling of the tablet was performed by Charles Lukens Huston, Jr., son of C. L. Huston, vice-president of the company. With this came to a conclusion the exercises of the day. Visitors were then given an opportunity to visit and inspect the various departments of the plant.

Those in Attendance

Among the guests of the company were the following:

John Fritz, Bethlehem, Pa.
Hon. Samuel W. Pennypacker, Pennypacker's Mills, Pa.
Craig Ridgway, Craig Ridgway & Son Company, Coatesville, Pa.
Jonathan R. Jones, Howard Wood and W. W. Lukens, Alan Wood Iron & Steel Company, Philadelphia.
Edgar S. Cook, Warwick Iron & Steel Company, Pottstown, Pa.
Leonard Peckitt and S. Carlton Peckitt, Empire Steel & Iron Company, Catasauqua, Pa.
W. W. Hearne, Matthew Addy & Co., Philadelphia.
Charles Hart, Delaware River Steel & Iron Company, Chester, Pa.
Charles Edgerton, Coatesville Boiler Works, Coatesville, Pa.
F. V. Smith, Vulcan Iron Works, Wilkes-Barre, Pa.
Wm. D. Craven, Iroquois Iron Works, Buffalo, N. Y.
Thomas Q. Wood, Alan Wood Iron & Steel Company, Philadelphia.
Henry Goldner, Philadelphia.
Ledyard Heckscher and H. W. Gwyn, Richard Heckscher & Sons Company, Philadelphia.
George B. Johnson, West Chester, Pa.
H. B. Workmore, American Dredging Company, Philadelphia.
Charles K. Barnes, C. K. Barnes & Co., Philadelphia.
Prof. Moses Ehlich, Springfield, Ohio.
P. A. E. Guerber, Guerber Engineering Company, Bethlehem, Pa.
G. A. Chandler, Lehigh University, Bethlehem, Pa.
W. H. Ridgway, Craig Ridgway & Sons Company, Coatesville, Pa.
Millard F. Carr, J. W. Paxson Company, Philadelphia.
Percy A. Marvel, Federal Refractories Company, Cleveland, Ohio.
J. F. Corlett and J. F. Cockburn, J. F. Corlett & Co., Cleveland, Ohio.
Wm. Nees, Baldwin Locomotive Works, Philadelphia.
Hon. Thomas S. Butler, West Chester, Pa.
W. P. North, North Bros. Company, Coatesville, Pa.
E. T. Moore and Fredk. E. Moore, Coatesville Boiler Works, Coatesville, Pa.
Joseph S. Hitner and Jos. Faltenmeyer, Henry Hitner's Sons Company, Philadelphia.
W. Vernon Phillips, F. R. Phillips & Sons Company, Philadelphia.
Emanuel Dreifus, E. Dreifus & Co., Philadelphia.
John H. McDermott and Thos. J. McDermott, McDermott Bros., Allentown, Pa.
Wm. Perry and W. H. Perry, Jr., Perry & Co., Providence, R. I.
Richard D. Gibney, Coatesville, Pa.
Penrose M. Davis, Coatesville, Pa.
Henry Howson, Howson & Howson, Philadelphia.
G. K. Mohr, J. J. Mohr & Co., Philadelphia.
Irvin Vannan, Danville Foundry & Machine Company, Danville, Pa.
Leon E. Thomas and A. S. Blanchard, Birdsboro Steel Foundry & Machine Company, Birdsboro, Pa.
Robt. Brooke and Dr. O. Brooke, E. & G. Brooke Iron Company, Birdsboro, Pa.
J. J. Caine, Jno. J. Caine & Co., Philadelphia.
G. H. Shern, Alliance Machine Company, Alliance, Ohio.
W. B. Simpson, A. M. Castle, Chicago.
George O. Gunderson, Acme Steel Company, Chicago.
H. E. Levick, Crew, Levick & Co., Philadelphia.
A. P. Haines, Link-Belt Company, Philadelphia.
H. A. Beale, Jr., and Geo. Thomas 3d, Parkesburg Iron Company, Parkesburg, Pa.
W. H. S. Bateman, Parkesburg Iron Company, Philadelphia, Pa.
L. K. Stubbs, Coatesville, Pa.

C. R. Hoopes, Hoopes Bros. & Darlington, Inc., West Chester, Pa.
James A. Coe, James Coe & Co., Newark, N. J.
H. T. Potts and Walter W. Cook, Potts & Co., Philadelphia.
W. B. Robinson and G. J. Starke, *Iron Trade Review*.
Elmer E. Rambo and W. S. Harlan, Coatesville, Pa.
J. E. Baker, Baker & Co., New York.
W. W. Fairer, Fairer & Son, Columbia, Pa.
S. B. Minnich, Minnich Machine Works, Landisville, Pa.
E. A. Corbin, Hartford Steam Boiler Insurance Company, Hartford, Conn.
Abner C. Baldwin, East Downingtown, Pa.
George M. Philips, West Chester, Pa.
Joseph Thompson, Philadelphia.
Edgar C. Ancott, Connery & Co., Philadelphia.
Howard M. Bate and Richard H. Bate, W. T. Bate & Son, Conshohocken, Pa.
Arnold Gersten, Percy Heilner & Son, Philadelphia.
H. Graham Rambo, Coatesville, Pa.
Jackson Taylor, M.D., Coatesville, Pa.
Gilbert Cope, West Chester, Pa.
A. H. Swing, Jesse Kenworthy and Jesse Kirk, Coatesville, Pa.
Jacob Edge, Edge Mills, Pa.
R. J. Clark, Philadelphia.
W. L. Tod, Wilmington, Del.
N. B. Wittman, Potts & Wittman.
August A. Miller, *The Iron Age*, Philadelphia.
Wm. Huston, Dumont, N. Y.
Charles Ducas, New York.
Charles P. L. Huston, New York.
John L. Lincoln, Lansdowne, Pa.
John L. Smith, Coatesville, Pa.
Also the following officers and representatives of the Lukens Iron & Steel Company: A. F. Huston, president; C. L. Huston, vice-president; Joseph Humpton, secretary and treasurer; Horace B. Spackman, purchasing agent; J. R. Van Ormer, general sales agent; Charles Humpton, assistant purchasing agent; F. H. Gordon, assistant sales agent; H. L. Binser, auditor; G. F. Schnatz, sales manager at Philadelphia; Warren H. Crampton, sales manager at Baltimore; Robt. Gardner, Harry Loeb, Charles L. Hunter, Alfred Goodfellow, O. F. Spackman, J. L. Christie, H. Taggart, F. H. Woodhull, P. Ralph Baker, C. F. Miller and Paul Haldeman.
Also the following officers of the Chester County Historical Society: George Morris Philips, president; Joseph Thompson and Samuel Marshall, vice-presidents; Gilbert Cope, recording secretary; J. Carroll Hayes, corresponding secretary; Lewis K. Stubbs, treasurer.

Obituary

J. HARRY DILLON, manager for 16 years of the New York branch of the L. & I. J. White Company, Buffalo, N. Y., died suddenly June 20 at his home in Brooklyn, N. Y., from acute indigestion, aged 40 years. He was born in Brooklyn and took the position above referred to in 1894, at the death of the then manager, Samuel White. He had previously been employed by the house of Gilbert & Sheridan. He was a man of exceptional qualifications and made himself of such value to his company by his indefatigability in the pursuit of business that the place he has vacated will be difficult to fill. He leaves a widow.

JULIUS BEILER, Pittsburgh, died June 30, aged 60 years. He was born in Germany and had been a resident of Pittsburgh for about 45 years. For many years he was treasurer of the Crescent Steel Works of Miller, Metcalf & Parkin, and after that concern was taken over by the Crucible Steel Company of America he served as treasurer of the new company for several years. At the time of his death he was president and director of the Third National Bank of Pittsburgh. He leaves a widow and one son.

J. ROSS NICOLS, St. Paul, Minn., died June 23, aged 60 years. He was born in Pittsburgh. His father, John Nicols, in 1855, established the wholesale iron, steel and heavy hardware house in St. Paul which was conducted for many years under the name of Nicols & Dean and more recently Nicols, Dean & Gregg. J. Ross Nicols became connected with the business in 1869 and at the time of his death was a director in the firm.

The Electrical Alloy Company, Morristown, N. J., has issued price lists of fine copper, brass and German silver ribbon ⅛ to 1 in. wide, and of 18 per cent. German silver resistance ribbon ¼ to 1 in. wide. The company makes a specialty of resistance materials.

Personal

Humphrey Bond of the metal house of Vivian Bond & Co., 68 Beaver street, New York, is in Europe on business, to be absent four weeks.

J. W. Hemmerle, formerly with E. M. Moore & Co., Pittsburgh, is now in charge of the contractors' machinery department of the Standard Supply & Equipment Company, 1151 Liberty avenue, Pittsburgh.

Edmund W. Mudge of E. W. Mudge & Co., iron and steel factors, Pittsburgh, has been elected a director of the Columbia National Bank of that city. Mr. Mudge is also chairman of the Board of Directors of the Phillips Sheet & Tin Plate Company, with plants at Weirton and Clarksburg, W. Va., and has large interests in the La Belle Iron Works, Steubenville, Ohio.

B. G. Follansbee, president of the Follansbee Brothers Company, Pittsburgh, manufacturer of tin plate and sheets, has sailed for Europe.

Charles A. Dennen has been appointed superintendent of the McKeesport Works of the American Sheet & Tin Plate Company at McKeesport, succeeding Dewees Harris, resigned.

H. H. Westinghouse of the Westinghouse interests at Pittsburgh, and George Mesta, president of the Mesta Machine Company, Pittsburgh, will sail for Europe July 16 to attend the international meeting of the Mechanical Engineers.

E. E. Wood will be the factory manager of the Grant & Wood Mfg. Company, Chelsea, Mich., which will manufacture automatic machinery. He was formerly general superintendent of the works of the Jones & Lamson Machine Company, Springfield, Vt., and later was with the Pratt & Whitney Company, Hartford, Conn. For the past four years he has been associated with the Walcott & Wood Machine Tool Company and its predecessor, the George D. Walcott & Son Company, Jackson, Mich., as president and general manager.

Henry D. Sharpe, head of the Brown & Sharpe Mfg. Company, Providence, R. I., has returned from a European trip.

Robert D. Meacham, son of D. B. Meacham, resident partner of Rogers, Brown & Co., Cincinnati, has been appointed a salesman, traveling in Ohio territory. He has been attached to the Buffalo office for about a year and was formerly connected with the Cincinnati office.

William S. Twining, for a number of years chief engineer of the Philadelphia Rapid Transit Company, Philadelphia, whose resignation was tendered several months ago, severed his relations with that corporation July 1. He will enter the service of Ford, Bacon & Davis, New York, electrical engineers.

C. A. Tupper, who has been in charge of the publicity work of the Allis-Chalmers Company for the past few years, was tendered a farewell dinner at the Gargoyle, Milwaukee, Wis., on the evening of June 30, by a number of his friends. Mr. Tupper recently resigned his position with the company to take the active management of the Reliance Engineering & Equipment Company, which he organized.

H. H. Hirschfield, sales manager of the American Saw Mill Machinery Company, 50 Church street, New York, will sail July 16 for an extended business trip through Cuba and Mexico. He will make a stop of several days in Merida, Yucatan.

Howard C. Rose, formerly with the Ingersoll Milling Machine Company, Rockford, Ill., and later with the Ford Motor Company, Detroit, has established a machine tool agency at 827 Ford Building, Detroit, where he represents the Ingersoll Milling Machine Company and Barber & Colman, both of Rockford, the latter being manufacturers of milling machine cutters, &c.

The American Society for Testing Materials

Papers and Discussions on Iron and Steel, Alloy Steels, Hardness Testing and Protection Against Corrosion, at the Thirteenth Annual Convention—A Memorial to Charles B. Dudley

The convention of the American Society for Testing Materials at Atlantic City, N. J., last week, lasting from Tuesday to Saturday, had the largest attendance in the society's history. There were eight sessions for the reading of papers and their discussion, besides an evening session for tributes to the man to whom more than to any other the present prosperity and influence of the society are due—the late Charles B. Dudley. Sixty-four papers, reports and orders of business were scheduled for the meeting. In a few cases the expected paper was not presented, but there were also cases in which an unscheduled paper became available for presentation, so that the volume of the society's *Proceedings*, which has averaged over 800 pages in the past two years, will again be very large. The membership of the society was reported to be 1280. The enrollment at the session ran up to 325, including 54 ladies, whereas the total of members and guests had not before been over 300. The absence of some familiar faces, particularly among the society's older members, was noticed; also the presence of a larger percentage than ever of young men, many of them on the early side of 30.

This year's meeting emphasized what was apparent last year—that the society is in a more settled period of well organized work. A good many specifications have now been formulated; the battles over steel rails have been fought. But there remain large programmes of work to be completed, while specifications are to be revised and new lines of investigation entered upon. In a few instances some friction has developed within committee bounds, but it has not been such as to create disaffection.

Many of the papers read at last week's meeting are not of direct interest to readers of *The Iron Age*. And of those which are, the volume is such that not all can be covered in the report below; a few papers, therefore, go over to a later issue. The question of hardness tests probably called out as much comment as any matter pertaining to iron and steel; there was also interest in the discussion on copper in steel, and the protection of iron and steel surfaces against corrosion is still proved to be important among the live subjects handled by the society.

The sessions devoted to cement and concrete, to bitumens and petroleum products and to testing machines and apparatus attracted a strong contingent and were well conducted.

THE MEMORIAL TO DR. CHARLES B. DUDLEY

The Wednesday evening session was devoted to addresses on the life and life work of Charles B. Dudley, for so many years the society's president. Probably there is no parallel to this gathering and to the tributes that made it memorable, in the annals of American engineering societies. So much is it the custom in such commemorations to dwell on achievements that this occasion was made remarkable for the equal prominence given to personality and character. Prof. Henry M. Howe presided.

The opening address was made by Robert W. Lesley, vice-president of the society, who spoke in behalf of the Executive Committee. The other speakers and the particular phases of Dr. Dudley's life work on which they touched were the following: "As a Railroad Man," by Theodore N. Ely, chief of motive power, Pennsylvania Railroad; "As a Chemist," by Edgar F. Smith, vice-provost of the University of Pennsylvania and past president of the American Chemical Society; "As a Metallurgist," by Henry M. Howe; "As a Mentor," by Col. B. W. Dunn, in charge of the Bureau for the Safe Transportation of Explosives; "As a Citizen," by W. H. Schwartz, editor of the Altoona *Tribune;* "A Personal Tribute," by Capt. R. W. Hunt.

It was not so much the eloquence and devotion of these tributes that made them impressive as the fact that the speakers showed such fidelity and adequacy in dealing with their subjects, saying not simply things that might be said but the things that their hearers felt must be said of the rare man who had been friend as well as leader. The session closed with the adoption by a rising vote of the following minute as prepared by Professor Howe:

Let us record at once our deep grief and our deeper gratitude; our grief indeed at the loss of a great leader and dear friend, but above all, our gratitude that we have had the privilege of being led.

Such measure of usefulness as our society has had it owes in very large part to that leadership. Here was a most rare combination of qualities, the sterling, the intellectual, the human, the judicial, each on a high level, all combining to form a character, a personality, whose like we shall not look upon again.

With a clear head to see the world's needs, to part the essential from the accidental and the merely concomitant, went the skillful and persuasive tongue to make clear to the rest of us what he had first made so clear to himself. With these went the perfect fearlessness, apparently even the unconsciousness of either danger or fear, which made him lead on where others would have flinched. With these again went his calm, clear, good judgment, which seemed to tell him spontaneously which among the good things that needed doing were the most worthy of being done, and what were the best and surest ways of doing them.

With all these admirable qualities went that which was necessary to the accomplishment of his high purposes, his kindness of heart, his sympathy and his tact, which made us all his allies in what he undertook. Had he a proposal? Our affection and veneration for him made us almost its advocates before it was unfolded. Its intrinsic wisdom, and the clearness with which he expressed it, found an audience ready, almost anxious, and certainly expecting, to be convinced.

Great as were his tangible works, his greatest was the imponderable. Standing on a high platform, his call raised us toward his level, all the more effectively because of his complete unconsciousness of his own hight. We who have known and loved him are for that knowledge and that love the better and the higher—how much, ah, who shall say?

METALLURGY OF IRON AND STEEL

Closing of Blowholes in Rolling Steel

Prof. H. M. Howe, on taking the chair at the meeting of Tuesday evening, was presented to the society by Mr. Lesley as its president-elect and was warmly greeted. Professor Howe, after acknowledging the honor, gave some further notes on the "Closing of Blowholes in Steel Ingots." What he described was in continuance of the inquiry of which he had given some details at the meeting of 1909. Pieces extending from front to back were cut out of the side of a steel ingot intended for boiler plate, one at the top, one at the middle and one near the bottom. The ingot was rolled down into a plate, which thus had three gaps extending in from one edge. Opposite these gaps pieces were cut out and their specific gravity compared with that of the ingot steel previously cut out, the latter proving to be considerably less. The closing up of blowholes in rolling was thus indicated. The next inquiry was as to the condition of the steel in view of the possible elongation of the blowhole into a seam. From the pieces of the plate cut out opposite the gaps thin slices were cut and these latter were bent nearly

double. If the blowholes had simply been elongated it would be expected that seams as much as 3 in. long would be found. Instead, the longest seam thus disclosed was 0.06 in. in length, while a number were but 0.02 in. in length.

Copper Clad Steel

In a paper on "Copper Clad Steel: Its Metallurgy, Properties and Uses," Wirt Tassin gave an account of the methods followed in the manufacture of this product at the works of the Duplex Metals Company, Chester, Pa. The weld between the two metals secured by the process employed is such that the copper can be separated from the steel only by melting it off. It will resist several temperature changes as well as great stress or shock. The clad metal can be rolled, swaged or drawn, hot worked or cold worked, and the proportion of copper and steel in the original billet will remain nearly a constant, no matter what the reduction, as from a 6-in. billet to a No. 12 wire.

The process as described by the author is in brief as follows: Steel billets are rolled to a 5 1-16-in. round, and cut into 26-in. lengths. It then passes to a machine in which both ends are drilled and tapped. After a special pickling and washing the piece goes to a preheater, from which it is drawn up into a heated tube by means of a rod and a bushing screwed into the billet. The rod slides up and down in the center hole of a three-jaw chuck, which holds the tube and centers the billet in it. A steel flange is then screwed on the bottom of the billet, forming with the tube a mold in which the billet is the core. The billet and its flange are now lowered out of the tube into specially prepared copper and held long enough for the copper to coat the surface of the steel and form with it an alloy. At a certain point in the reaction the billet is drawn up into the tube and the whole carried to a second furnace of the pit type, the pots of which contain the purest commercial copper. The tube and billet are lowered into a crucible; the molten copper rushes in through two openings in the top of the tube, unites with the alloyed area and fills the mold. The tube is then withdrawn from the crucible and when the copper has set the chuck, rod and flange are unscrewed, the copper clad billet pushed out of the mold and after heating it is rolled to the desired size and shape. The rolling is in general similar to that of steel.

With 40 per cent. of the sectional area is copper and the 60 per cent. steel containing not over 0.15 per cent. carbon, 0.40 per cent. manganese and 0.04 per cent. sulphur and phosphorus, the tensile strength, after the proper treatment, is close to and the yield point greater than that of an all steel rod of equal section and similar composition and treatment. The yield point of copper-clad steel will average 84 per cent. of its ultimate strength when dead soft. The high values noted were attributed in the paper to the influence of the first dip or alloy coat of copper and its effect on the structure of the steel. Views were thrown on the screen showing a much finer grain in the copper coated than in the uncoated steel. In the weld area certain compounds are present which, together with the copper, have a far reaching effect.

Tests on copper-clad rods show that when corrosion sets up it begins at the center of the steel instead of at the point of contact of the two metals, while with a copper tube shrunk on a steel rod exactly the reverse is true. The explanation is that in copper clad there is a definite union of the copper and steel and that certain products of this union have properties which retard ionization and do not accelerate corrosion.

The most obvious use of copper-clad steel is as wire for electrical and mechanical purposes. Copper clad steel electrical wire has an average conductivity of 40 per cent. of the same size copper wire. In telephone work the life of the wire depends on its breaking weight and elastic limit. These are for a No. 10 copper wire, respectively, 530 and 293 lb., while that of a No. 14 copper clad is 760 and 320 lb. The one weighs 166 lb. per mile and the other 61 lb. Having the strength of steel and the durability of copper, the copper clad wire is especially of value where high tensile strength and resistance to corrosion are essential and good conductivity is desirable. Since steel of any desired physical qualities may be used as a core, copper clad is adapted to bridge work, derrick guys, rigging, springs, rounds of all sizes suitable for anchor bolts, pump rods, &c. For large structural shapes it is questioned if copper clad will have a commercial use, though it has value for light shapes for skylights and similar work.

DISCUSSION.

The high elastic limit of the copper clad steel was commented on as surprising. In response to a question Mr. Tassin said that the steel adjacent to the weld showed a lowering of carbon. The important point was the profound change which took place in the structure of the steel as a whole—the much greater fineness of the grain and the fibrous character of the structure.

Dr. Waldo referred to the hardening of steel by chilling, while copper softens by chilling. He pointed out the difficulty of speaking positively about moduli of elasticity of such compound metals. In this connection he suggested the appointment of a committee of three to report at the next annual meeting on the proper use of the terms "modulus of elasticity" (Young's modulus) in engineering specifications and descriptions, including its use in describing non-ferrous metallic materials and combinations. This suggestion was later put in the form of a resolution and adopted.

Professor Howe suggested that the high elastic limit reported for copper clad steel might be due to the mode of application of the stress. In the weld area are iron-copper alloys of unknown elastic limit, and the stress is transmitted from a metal of low to one of high elastic limit.

Cupro-Nickel Steel

G. H. Clamer, Philadelphia, read a paper on "Cupro-Nickel Steel," which represented considerable new work in this class of alloys.

At the outset he reviewed the results of investigations of the iron-nickel and iron-copper series. He showed that iron-copper alloys can be produced carrying 5 to 20 per cent. copper, which without nickel would be extremely hard, brittle and red short, but by adding nickel in the proportion of 20 to 50 per cent. these become highly ductile, easily forgeable and easily machineable. Tests of two typical alloys within the above range showed the following:

	No. 1.	No. 2.
Copper	9.00	19.50
Nickel	22.00	45.00
Carbon	0.22	0.2
Ultimate strength, pounds	101,000	98,230
Elastic limit, pounds	57,300	54,150
Elongation, per cent	42.5	35
Reduction of area, per cent	61.5	47.9

Such alloys, it was suggested, might be used in place of the present 25 to 35 per cent. nickel-steels because the steel can be produced at a much lower cost, not only because of the substitution of copper for nickel, but because the alloy can be made from monel metal, which sells at about the price of copper. It is also possible to make the steel directly from Sudbury nickel ores by smelting and Bessemerizing to eliminate the iron to the extent desired, roasting the matte produced, and finally producing the combined oxides resulting from roasting the matte. It is believed that either by the use of monel metal for making the steel alloy or by its direct production from the ore the cost might be sufficiently reduced to make it attractive for roofing, gutters, spouts, ventilators and other uses. Such sheets can be sold at much less than copper—probably at two to four times the cost of coated steel sheets, but the alloy is twice as strong as steel and three times as strong as copper sheets and thinner gauges can be used. At the higher end of the series these alloys are nonrusting.

The author also experimented with the lower copper-nickel alloys to note the effect of replacing part of the nickel in nickel-steel within the pearlitic range by copper. He made such sheets with 1 to 8 per cent. monel metal, in which the proportion of nickel to copper is roughly 2½ per cent. nickel to 1 per cent copper. Here again the copper really acts like so much nickel, at least when present in

these relative proportions, and it is possible, therefore, to produce a steel of practically the same physical proportions as nickel-steel at very much reduced cost. In these steels the nickel, iron and copper are in the same relative proportions in which they exist in some of the prominent mines at Sudbury, Ont., averaging analysis of these ores being as follows:

Copper	8 to 2.00
Nickel	2 to 5.00
Iron	35 to 52.00
Sulphur, Gangue	Balance.

By the operation of reducing this ore to matte, calcining the metal to remove the sulphur and reducing the calcined product this steel can be produced almost to the most desired formula. The valuable properties of nickel-steel carrying below 6 per cent. nickel have long been recognized, and recently the value of copper as a valuable constituent of steel, instead of a metal to be looked upon as detrimental has also become recognized. It is probably not quite so surprising, therefore, that the joint addition of copper and nickel within this range of proportions is productive of valuable results. The addition of these two metals in combination seem to have the same effect upon the steel as if they were individually added, the copper in its effect really being about the same as so much added nickel. It is possible, therefore, to replace part of the nickel in nickel-steel by copper without materially altering the physical properties. The following table gives the physical properties of some of these alloys:

	Monel metal.	Carbon.	Ultimate strength.	Elastic limit.	Elongation.	Red. area.
No. 1	4	0.11	83,600	66,300	26.5	65.4
No. 2	3	0.10	75,300	64,600	25.5	71.4
No. 3	2	0.15	75,500	63,700	28.0	65.4
No. 4	4	0.61	151,600	120,000	8.0	15.8

Copper in Steel Not Injurious

John A. Matthews, general manager of the Halcomb Steel Company, Syracuse, N. Y., described as follows some of his experiences with steels containing nickel and copper.

In looking up this subject I was surprised to find how little attention has been given in papers and discussions that have been presented to the American Society for Testing Materials during the past five or six years to the general subject of copper in steel. So far as I recall none of the society's specifications mention copper at all; however, I find that there is still in the minds of many users of steel a prejudice against copper. A year or two ago we sent a large quantity of spring steel to the Panama Canal. Upon its receipt we were advised that the copper content exceeded the specification, and it was reported as being from 0.07 to 0.12, whereas the specification had stated that the steel was subject to rejection if the copper exceeded 0.05. Our own analyses confirmed the fact that the copper was higher in the steel than we had expected, but the writer looked up the authorities on the subject and presented such an eloquent and convincing brief that not only was the steel accepted, but specifications since that time have omitted any reference to the copper content.

In connection with nickel-steel a firm of automobile manufacturers formerly specified that the copper in their nickel-steel should not exceed 0.025. The writer was instrumental in getting this specification changed so that the user shifted the decimal point for copper one point to the right, making the permissible amount 0.25, and still later omitted all mention of copper in his specification.

It is hardly necessary here to review the large number of recent investigations that have been made in connection with this subject; for example, the articles that have appeared in the journals of the Iron and Steel Institute of late years by Stead, Wigham, Colby, Breuil and others; also articles by Dillner, Müller and Bischoff in *Stahl und Eisen*, together with the statements by Harbord, Campbell and Howe in their general treatises on steel. It is, perhaps, a surprise to many to know how generally present copper is in all kinds of steel, even in the best grades of Swedish materials. Bischoff published the analyses of some 40 or 50 samples of German and Swedish steels, and every one of them contained copper, the amounts varying from mere traces up to 0.274. It is sufficient to say, however, that the general trend of scientific work in connection with the influence of copper and steel has been to show that in any ordinary quantities in which it is likely to be found its effect is not marked one way or the other, or may even be benficial.

ELECTRIC CUPRO NICKEL-STEEL.

The particular experiment in reference to cupro nickel-steel to which I should like to refer is of perhaps more than ordinary interest, owing to the fact that the heat of nickel-steel containing copper was melted in our Héroult electric furnace [Halcomb Steel Company], and that the pig iron used in this heat was produced in Canada in the Héroult smelting furnaces which were installed there some years ago—that is, the entire heating from the ore to the finished product was by means of electricity, and this is probably the first heat of steel so made in the United States. The pig iron, as produced from certain of the Canadian ores, carries a considerable amount of nickel and copper, and it was with a view to seeing what results could be obtained from this pig iron that we made a cold heat, charging in cold pig and ore into our furnace. The result of this heat gave steel of the following analysis:

Carbon	0.44	Sulphur	0.013
Silicon	0.034	Nickel	3.62
Manganese	0.50	Copper	0.48
Phosphorus	0.013		

It must be remembered that all the nickel and copper present were contained in the original pig iron used. We had no definite analysis in mind when we started this heat, but were more interested in finding what grade of steel would result from the grade of pig used. The ingots were clean and worked very satisfactorily under the hammer, and the ½ per cent. of copper present seems to have exerted no deleterious influence as regards the heating or working. For the sake of comparing this steel with another steel of approximately the same analysis but free from copper we selected an open hearth nickel-steel whose heat analysis was as follows:

Carbon	0.46	Phosphorus	0.021
Silicon	0.066	Sulphur	0.034
Manganese	0.70	Nickel	3.36

An examination of this heat showed that it also contained about 1-10 of 1 per cent. of copper. The physical tests to be mentioned later were made from ⅞-in. diameter round bars, and the greatest care was used in their heat treatment. Tests were made in duplicate and the bars from the two heats were annealed at the same time so as to avoid any possible difference in the annealing temperature. It was noted that the open hearth steel machined a little more freely than the electric furnace nickel-steel containing 0.5 per cent. of copper, but here the superiority ended. The tensile tests of the material as rolled gave us the following figures:

	O. H. nickel.	Cupro-nickel.
Elastic limit, pounds	74,626	72,400
Ultimate strength, pounds	122,000	115,000
Elongation in 2 in., per cent	16	22
Reduction in area, per cent	34	51

In the annealed condition the physical tests were as follows:

	O. H. nickel.	Cupro-nickel.
Elastic limit, pounds	64,750	63,750
Tensile strength, pounds	119,000	107,300
Elongation in 2 in., per cent	17	25
Reduction in area, per cent	37.5	48

Samples of both steels were heated to 1500 degrees F., quenched in oil and drawn back to a temperature of 800 degrees F. and maintained at that temperature for 20 minutes. In this condition the results of physical tests are as follows:

	O. H. nickel.	Cupro-nickel.
Elastic limit, pounds	154,500	154,000
Tensile strength, pounds	175,000	172,500
Elongation in 2 in., per cent	9.75	13.25
Reduction in area, per cent	30.8	49.1

SUPERIORITY OF CUPRO NICKEL-STEEL.

In all the tests above the elastic limits and tensile strengths are not very different for the two steels, but the very great superiority of the cupro nickel-steel in the elongation and reduction of area is most noticeable. The presence of the copper certainly has not in any way decreased the toughness of the steel, as manifested in its elongation and reduction of area, but the most remarkable difference in the two steels was noticed in samples which had been quenched as before at 1500 degrees F. and drawn back to only 600 degrees F. In this condition both steels showed an elastic limit of about 185,000 lb., with the tensile strength slightly above 200,000 lb., but, whereas the open hearth steel was decidedly brittle by this treatment, only giving 2 per cent. elongation and 4 per cent. reduction in area, the electric furnace product gave 12 per cent. elongation and 46 per cent. reduction in area.

So far as this single test is concerned, therefore, there is absolutely no evidence to show that the copper has exerted a harmful influence upon the nickel-steel, and we must either ascribe its superiority to the presence of copper, or to the superiority of the electric method of melting, or to both acting jointly.

From an extended experience with electric furnace product, as compared with the open hearth nickel-steels in carbons varying from 0.10 up to 0.50, there no longer remains any doubt in my mind as to the superiority of the electric product over open hearth nickel-steel.

The Héroult furnace, with which I have had experience, was the first commercial electric furnace installed in the United States, and the result of this experiment, where both the pig iron and the steel were of electric furnace origin, seemed to me of sufficient interest to present to the society.

DISCUSSION.

Captain R. W Hunt believed the more recent disposition to ignore copper in steel specifications was

due to experience with metal from Cornwall ores, all of which contain some copper. He had made rails with 0.5 per cent. copper and they were good rails, though of smaller section and intended for lighter traffic. They were low in phosphorus, high in copper and incidentally high in sulphur. It must be largely on the lines of alloys, he thought, that further advancement is to be made in steel. The ores recently found in northern Cuba contain rare elements naturally combined and results with these would be noted with interest.

J. V. W. Reynders, vice-president and general manager of the Pennsylvania Steel Company, was asked to comment on this company's Cuban ores, said that these ores in the Mayari district contain nickel and chromium, and in time data would be available as to the results of mixing these ores with Cornwall ores containing copper. In more recent years, he said, the copper has been eliminated from Cornwall ores, but for the sake of the profit from copper.

Henry Souther referred to copper as detrimental to welding quality in steel, particularly in tubes. The copper seems to have a more unfavorable effect on welding than sulphur. Steels of high phosphorus and high sulphur weld better than those having low phosphorus and low sulphur with some copper. The latter are red short and will not weld.

It was stated that the Lackawanna Railroad has on its line a good many rails containing copper, rolled at the old Scranton mill of the Lackawanna Iron & Steel Company. Recently an 80-lb. rail was taken up which showed 0.40 per cent. carbon and 0.6 per cent. copper.

The Effect of Titanium on Segregation

Dr. Geo. B. Waterhouse, metallurgist of the Lackawanna Steel Company, presented a paper on "The Influence of Titanium on Segregation in Bessemer Rail Steel." It is printed on another page.

DISCUSSION.

Professor Howe spoke of quiescence as one of the things that strongly oppose segregation in steel. Quiet steel encourages the formation of pine tree crystals at the side and the molten metal is landlocked. The action of titanium he considered to be similar to that of alûminum, on which Mr. Talbot has written.

A. A. Stevenson, Standard Steel Works, thought that the addition of aluminum or even of silicon to the steel would give the same result as was secured with titanium in the cases cited.

Henry Souther raised the query whether temperature was not as important an element as titanium in the tests described, seeing that the steel to which titanium was added was held 3 min. before pouring.

The question was raised by F. N. Speller as to the effect of titanium on open hearth steel. While no tests on such steel were cited in reply, it was conceded that Bessemer steel, being quieter than open hearth, the results from titanium with the former would naturally be more favorable. In reference to the possibility of getting too cold a steel from holding it in the way described in the paper, Professor Howe remarked that with the larger charges of to-day there is not the danger that was once feared from a lowering of the temperature.

TESTS OF IRON AND STEEL

Strength of Steel from I-Beams

E. L. Hancock, professor of applied mathematics in Worcester Polytechnic Institute, gave the results of tests made on pieces cut from standard I-beams varying in size from 6 in. 13.5 lb. to 20 in. 65 lb., and on pieces cut from three Bethlehem beams. The specimens were cut from the middle of the web, the root of the web and the flange near the root, and were designated in the tabulation of results as, respectively, W, R and F. The broken test pieces showed some differences of structure. W showed a fine surface in the region of the fracture, while R and F were much coarser. The small beams had a fine structure generally and all the Bethlehem beams tested showed a very fine structure with silky fracture. There were variations in strength, which the author considered due to the varying amounts of work on different parts of the beam in rolling.

The value of the data given in the paper was lessened by the absence of chemical analyses, though later, it was stated, funds may be available for complete analyses. Samples from one set of three pieces were examined for carbon, W showing 0.22 per cent., F 0.27 per cent. and R 0.25 per cent. This suggested that differences in chemical composition might have to do with the variations in strength. Illustrating these variations, three pieces were tested from the flange of one beam. The one cut near the root of the web had an elastic limit of 24,000 lb.; the one from the extreme edge of the flange had 36,000 lb., and the one from an intermediate location had 34,000 lb. The author's tables of elastic limit contained a good many low values. A piece from the root of the web of a 20-in. 65-lb. beam had an elastic limit of 13,500 lb., and there were several instances of less than 20,000 lb. The yield point was not given in the tables accompanying the paper, but the author said that it was found to differ much more in the Bethlehem beams than in the standard beams. His general statement was that the differences between elastic limit and yield point in the various specimens ranged from 3000 to 8000 lb. The average elastic limit of the 33 pieces tested from standard beams was about 26,000 lb. and the ultimate strength 60,000 lb. Of the nine specimens from Bethlehem beams the average elastic limit was 26,300 lb. and the average ultimate strength 65,500 lb. A summary of the results was made as follows:

1. The elastic limit varies considerably for material cut from different portions of the beam, both standard and Bethlehem being lowest in root of web, higher in flange near root and highest in web. This confirms the work of Professor Marburg.

2. The indications are that there is considerable difference chemically in the material in different parts of the beam. It is desirable that these chemical tests be made and recorded as a part of this investigation.

3. The appearance of the fractured pieces indicates a considerable variation in the density of the material throughout the beam, due probably to the work of rolling The thin beams show material superior to that of the thick beams.

DISCUSSION.

Secretary Marburg said that one of the most important questions relating to the strength of I-beams is the amount of load that will cause the beginning of a continuous increase of deflection; in other words, to determine that load which will cause a progressive failure of the beam. What is wanted is tests that will subject a beam to such static loads as are borne by the beam in actual service.

The further point was made in the discussion that since tests of beams have not been made in which loads and stresses were like those to which the material is subjected in service it is well to have an ample factor of safety and to make sure that the elastic limit of the steel is not approached too closely.

Professor Howe noted the fact that out of 11 standard beams from which pieces were taken for Mr. Hancock's tests there were eight in which the web had a higher elastic limit than the flange, while in no case did the web have a much higher elastic limit than the flange. The explanation might be that the web was finished colder than the flange.

"Tests of Steel and Wrought Iron Beams"

Under the above title, H. F. Moore gave details of tests carried on in the past year in the laboratory of

applied mechanics of the University of Illinois. The material tested was principally small I-beams and the principal object of the tests was to investigate twisting action and sidewise buckling and to determine the magnitude of the direct bending stresses developed in the beams at failure. Only preliminary results were given. The author suggested that the limit of proportionality of stress to deformation would have been found at stresses lower than those he gave for elastic limit, had more delicate instruments been used. Many structural members, he added, are stressed locally, in the process of manufacture, beyond the limit of proportionality, as, for example, I-beams are often cold straightened to bring them into proper alignment. Many such members are standing severe service, though the stress due to load has been added to local stress in manufacture. It is not certain, therefore, that the limit of proportionality is a satisfactory criterion of load-carrying capacity. Another deduction made was that one effect of sidewise restraint is to raise the modulus of rupture nearly to or slightly above the yield point of the material in tension and to cause failure to take place slowly.

Test of a Structural Steel Plate Partly Fused by Electric Current

A. W. Carpenter, New York, reported the results of tests on a steel plate which had been partly fused by a short circuited electric current. The electrification of the New York Central road out of the Grand Central Station involved carrying electric third rail and electric power cables over the Park avenue viaduct, about 1¼ miles long. The cables were placed in steel tube conduits just over the tops of the girders on which the conduits were supported on wooden blocking. A short circuit fused the conduit pipe and burned the underlying cover plate, the burn extending clear through the plate at one point. The conduit metal and cable copper were fused into the plate. The injured portion was cut off and replaced with a new plate. Tests were made to determine how the strength of the plate had been affected. These were described at some length. The conclusion drawn was that the injury did not extend far beyond the limits of the visible burning. This change was enough to reduce the static strength of the plate tested some 40 per cent. and to destroy its ductility. It was concluded that a plate with a similar injury would be unreliable for service, but that if the local injury were cut away the balance of the section would have practically the same unit strength as before.

Tests of Rail Steel

M. H. Wickhorst, who is now engaged in making investigations of rail steel for the American Railway Association, reported on open hearth rail which failed by splitting through the head in various directions, through the web vertically or diagonally, vertically from the head to the base and in other ways. Sections were examined under the microscope after polishing highly and etching. Most of the split rails showed light streaks or patches indicating streaks of metal low in carbon. It was at first thought that slag in the metal caused the white streaks, possibly by oxidizing the carbon. The author then says:

> This may perhaps be true of small streaks, but it was later learned that it was the practice at the mill that made these rails to put small soft Bessemer steel plates on the stools of the molds to reduce the cutting out of the stools by the hot metal. These plates, it seems, get churned up with the rest of the metal, melt partly or wholly, but before becoming thoroughly mixed with the main body of steel, the metal sets, leaving streaks as shown in the figures. It had been thought that the first metal poured would set and hold the plate at the bottom of the ingot, where it would be sheared off, but as soon as it appeared that the plates caused streaks, as shown, the practice was promptly stopped. A few similar failures have been noted in rails from other mills, but whether due to a similar cause has not been determined.

P. H. Dudley, New York Central Lines, had prepared a paper of some length on "Elongation and Ductility Tests in Rail Sections Under the Manufacturers' Standard Drop Testing Machine." In the author's absence it was read by title.

Apparatus for Testing

J. Madison Porter gave an interesting account of "Some Testing Accessories" as employed in the laboratory of Lafayette University, exhibiting various pieces of apparatus specially devised by the speaker and his associates.

A paper by Albert Sauveur, Cambridge, Mass., described "Apparatus for the Microscopical Investigation of Metals," including some attachments devised by the author.

COMMITTEE REPORTS ON IRON AND STEEL

Progress Toward International Specifications

The report of Committee A1 on Standard Specifications for Steel, the chairman of which, William R. Webster, Philadelphia, is now in Europe, was presented as a printed pamphlet of 16 pages. It dealt almost entirely with the Copenhagen Congress of the International Association for Testing Materials and the conferences of members of international Sub-Committee 1A on Specifications for Iron and Steel. One of these was held in London July 1, 1909, and a more informal one at Copenhagen in September. The results have already been given in *The Iron Age*. In brief, the representatives of England, Germany and the United States have recommended that the specifications of the British Engineering Standards Committee, the Deutscher Verband für die Material Prüfungen der Technik, and American Society for Testing Materials be used in the respective countries for materials manufactured on export orders. It was also recommended that when one of these associations revises its specifications hereafter it endeavor to bring them in line with those of the other two countries; also that manufacturers be induced if possible to roll trial orders for material under the conditions of the specifications of other countries, to find out how far these conditions can be introduced for export orders. The sub-committee also decided to consider specifications from other countries than the three named provided differences were harmonized within those countries and one representative standard specification be submitted for each class of material.

The report indicates a departure in the procedure as to international specifications on steel from that followed on cast iron. Chairman Webster held that there should be a harmonizing of differences in each country for itself, and that the international Sub-Committee on Iron and Steel should not attempt to do this. On the other hand (as indicated in the report of the Committee on Cast Iron, referred to in last week's issue of *The Iron Age*), when it came to cast iron, those who attended the informal conference at Copenhagen decided not to proceed under the so-called London resolutions, the recommendations of which are summarized above (and which provide for discussing specifications at future annual meetings), but to undertake at once an international unification of the cast iron specifications.

The report of Committee A1 has this to say as to the prosecution of the work to be done previous to the next meeting of the International Congress, to be held in the United States in 1912:

> Instead of submitting proposals for international specifications to the Congress in 1912, the work should be completed by that time and international specifications submitted for approval. This can be done if the work is started at once in a systematic manner, and funds provided for carrying it on here and abroad. Summaries of the specifications from each country should be tabulated, published in French, German and English, and promptly delivered to all the members, then the work will go on continuously and the general interest maintained. The specifications for ship material, boiler material, steel wire, &c., should be taken up in addition to those already considered.
>
> The co-operation and support of the national engineer-

ing societies and the various departments of the governments are needed in this most important work, both by their taking part in the work of committees on specifications and by giving their financial support. In addition to this a general subscription from the steel manufacturers and others interested will have to be solicited.

A great deal has been said about increasing the export trade of this country, but how can this be done so long as the contracts embody features in favor of English and Continental manufacturers, which are purposely inserted to send the orders to their countries? Reference is here made to specifications for steel rails, locomotives, bridges, &c., which form part of every contract for export orders. This matter is not generally understood, and too much light cannot be thrown on it at this time, now that the general movement for international standard specifications has been started and our Government officials are doing all they can to extend the export trade of their country.

On motion of Walter Wood the report of the committee was "received and filed."

Specifications for Cold Drawn Steel

A progress report was presented by C. E. Skinner, chairman of Committee A8 on Standard Specifications for Cold Drawn Steel. Twenty tons of standard automatic screw stock has been made up by producers in accordance with the requirements decided on by the committee. The work undertaken includes chemical tests, physical tests and tests for machining quality under various conditions of machining speed, with a complete record of tools used, pieces made and other details.

For Committee B1 on Standard Specifications for Hard Drawn Copper Wire, it was reported that the specification is being revised and will be submitted later.

DISCUSSION.

Professor Lanza suggested that the question of maintaining the straightness of cold drawn material, also the matter of hidden flaws, be considered in connection with the specifications. The chairman of the committee said it was believed a specification could be prepared covering all grades of cold drawn material, though the committee was chiefly concerned with the requirements for steel for use in automatic machines running at high speed. Mr. Souther said he had been interested in investigations of the machinery qualities of cold drawn steel. He had used both the Brinell and the Shore tests for hardness and believed both these methods to be of material assistance. He was not prepared to say that the hardness test is a correct measure of machinery quality, but results seem to point that way.

Specifications for Staybolt Iron

The Committee on Standard Specifications for Staybolt Iron submitted a revised specification, which under the rules goes over for one year. The changes consist of the following: The addition to the first sentence of the words "the basis of which must be pig metal and entirely free from any admixture of steel." The omission of the following matter: "The pile must be made up of a central core composed of bars from ½ in. to 1 in. square and be covered on all four sides with an envelope ⅝ in. thick, as per sketch. This pile must be rolled to a billet, allowed to cool, again heated, and then rolled into bars of the required dimensions." The substitution of a nick and break test for the threading test. The revised specification is as follows:

PROPOSED STANDARD SPECIFICATIONS FOR STAYBOLT IRON.

Process of Manufacture.

All staybolt iron must be hammered or rolled from a bloom or a box-pile having a cross-sectional area of at least 45 sq. in., and not less than 18 in. long, the basis of which must be pig metal and entirely free from any admixture of steel.

Physical Tests.

(*a*) Tensile Strength.—Not less than 48,000 lb. per square inch.

(*b*) Elongation.—Not less than 28 per cent. in 8 in.

(*c*) Reduction of Area.—Not less than 45 per cent.

(*d*) Double Bending Test.—Close in both directions without flaws.

(*e*) Nick and Break Test.—A bar, nicked all around to a depth not less than 8 per cent. and not more than 16 per cent. of the diameter of the bar, and broken, shall show a clean fiber entirely free from crystallization.

(*f*) Vibration Test.—The test bar shall stand a minimum of 6000 revolutions when subjected to the following vibratory test:

A threaded specimen, fixed at one end, has the other end moved in a circular path while stressed with a tensile load of 4000 lb. The circle described shall have a radius of 3-32 in. at a point 8 in. from the fixed end of the specimen.

Inspection.

(*a*) The Iron must be smoothly rolled and free from slivers, depressions, seams, crop ends and evidences of being burnt.

(*b*) It must be truly round within 0.01 in. and must not be more than 0.005 in. above or more than 0.01 in. below specified sizes.

Selection of Samples for Test.

The bars will be sorted into lots of 100 bars each and two bars will be selected at random from each pile. Failure of either of these bars to meet any of the above specifications will be cause for rejection of the lot which the tests represent.

TESTING METALS FOR HARDNESS.

The Shore Scleroscope and Other Devices

A paper which brought out considerable discussion was that of A. F. Shore on "The Scleroscope." This instrument was described in *The Iron Age* of August 27, 1908, p. 555. Not only Mr. Shore's paper dealing with his ingenious and already widely used device, but the comments made later by many who have used it illustrated that testing engineers are far from agreement in their attempts to define hardness and in their ideas of the best means of measuring it. Mr. Shore's paper traversed the subject at great length, tending to clear up some points that have been matters of dispute, while as to others it must be said that the author's statements lack something of perfect clearness. Mr. Shore laid stress on one proposition, namely, that there is but one kind of hardness in the eye of the practical constructing engineer. He could not accept the distinction sometimes made between "static" and "dynamic" hardness. Discussing "cutting hardness," as referred to by Professor Turner, the author explained why in a certain cited case a brass which showed 12 hard by the scleroscope cut copper showing 20 hard, saying among other things:

If a chip is cut off any metal, particularly when the tool is blunt, a certain amount of pressure is required. This pressure must always exceed the ultimate strength and, therefore, the chip is superhardened. Suppose now we were to select a piece of cold rolled or hammered copper which in the casting measured 6 hard, but as the result of pressure superhardened to 20, and, on the other hand, we took a piece of brass 12 hard in the annealed condition or as a casting, and we then scraped the edge of one over the other to see which one would be cut. If we remember that there is a great deal of superhardening due to the brass casting as soon as it is exposed to compression—twice as much, perhaps, as the limit of the copper—is it not clear that the piece of brass must easily cut the copper which was already compressed and could be superhardened no further, at least under the pressure required to do the said cutting?

The author distinguished between what he called "basic hardness," the amount of superhardening due to cutting pressures, and toughness, the last named being greater as the difference between basic hardness and the superhardness due to cold compression increased. Further on, the different fields of the various instruments designed to show hardness and machining quality are referred to as follows:

We will assign to the sclerometer the property of measuring the abrasive increment, which should be particularly valuable in connection with cutting operations because of its cutting action. The ball test measures resistance to penetration under a constant pressure, the scleroscope measures precisely the same thing, with the only difference that it measures the resistance to penetration under shock. Then we may also consider the drill test for hardness, for there is a machine built which does this scientifically. I regret very much that I am not more familiar with the sclerometer, but I can readily see that, for instance, on 7 per cent. nickel-steel this instrument would read high, while the scleroscope and the ball test show it is low. On cold rolled metals it would probably measure the basic hardness only, giving no account of the additional hardness which the rolling mill man put into it. Probably the drill test and the sclerometer, which are both cutting devices, agree very closely on this point, that when a metal is cold rolled it is not much more difficult to cut than if it were left hot rolled, in spite of the rapid increase of the hardness as agreed on by the scleroscope and the ball test.

Now if these two cutting devices kept on agreeing all through the severe trial there is no doubt that they would be valuable, and would enable us to solve metallurgical problems of great importance. A little practice will show,

however, that the drill test will not agree with the sclerometer, and it may show anything but the physical hardness, although it is probably a fact that it will show us something about the abrasive element in metals in a soft state, for it will indicate the amount of tool wear under perfect conditions (because the drill is a cutting tool) which would be caused by the presence of abrasives. To thus prove that the drill is useless as a means for testing hardness we do not have to go very far. Thus manganese steel only 30 hard cannot be drilled as much as high speed steel annealed, showing more than double this hardness, while yet a cold chisel will very easily cut large, smooth chips off the manganese steel such as it should on material showing a hardness of 30. Why is this? Because the drill cuts with a scraping action, thus giving the abrasive element in manganese steel a chance to wear away its edge at once, while the cold chisel, acting in a different way so as to escape the abrading effect for the most part, will be enabled to cut manganese steel. Likewise the drill will report a false hardness on carbon steel when compared with tungsten steel, as well as cast iron having a high silicon or manganese content, and which are abrasives, and so on. In this connection there is a great deal of research work to be done, and it would be particularly interesting to have more data regarding the complete performance of the sclerometer when compared with the readings of the scleroscope and the ball test.

DISCUSSION.

Professor Howe called attention to the fact that a number of qualities are commonly grouped under the term "hardness." There is a difference in hardness as determined by different methods. For example, for crushing certain kinds of rock a stamp shoe of cast iron is best, giving better service than would hardened steel. Under other conditions manganese steel does very well, the selection of the stamp shoe depending on the character of the rock. A manganese steel rail has great resistance to abrasion. It was also thought, until it was tried, that manganese steel would be an ideal material for car wheels; put to the test it was entirely disappointing. Why a manganese steel car wheel running on a rail wears away while a rail of the same unit stress resists so well is not clear. Cohesion manifests itself differently under differing conditions of stress; if there were no differences in cohesion the problem would be simple.

J. H. Parker, Reading, Pa., had found in tests made with the scleroscope some variables that need to be accounted for. To get accurate results the glass tube must be plumb and the surface of the material tested must be normal to the line of impact. In the case of hot worked material there is a surface decarbonization, and in such cases low values are obtained, whereas a few thousandths of an inch below the true values would be found. The surface must be properly prepared.

Attention was called in further discussion to the fact that the scleroscope gives good results with thin material, provided it is properly supported. It was stated that the effect of case hardening is accurately measured if the case is not too thin.

D. E. Douty, Washington, D. C., referred to the tests for hardness made by the Bureau of Standards, five methods being used. The results will be published in due time. The speaker put on the blackboard the following statement of results with the Brinell and scleroscope methods:

	Scleroscope.		Brinell hardness numeral.
Tool steel	86.1	(107)	641
Silicon steel	33.6	(43.7)	262
Manganese steel	29.5	(30)	179
Cast iron No. 1	33.3	(25)	149
Cast iron No. 2	32.9	(28.7)	172
Bessemer steel	26.6	(31)	185
High carbon steel	37.8	(48)	289
Cu(70) Sn(30) alloy	42.4	(18.3)	110
Cu(80) Sn(20) alloy	25.5	(16.7)	100.5
Cu(90) Sn(10) alloy	22.1	(15.8)	94.7
Copper	15	(14.7)	88.5

[Between the two columns of figures we have set down in parenthesis the quotients arising from dividing the Brinell figures by 6, this being the ratio used in making comparisons, published abroad, of Brinell ball and Turner sclerometer tests. It will be seen that some of the figures agree closely with the corresponding ones in the first column; others are further off, while others differ widely.—EDITOR.]

Bradley Stoughton spoke of the rapidly increasing employment of the hardness test in metal working establishments. In time, in the interchange of material between works, some form of hardness test will need to be agreed upon to become the basis of acceptance of steel and other metals. Already the International Society for Testing Materials has published the results of large numbers of static and dynamic tests and the relations of the Brinell numerals to ultimate strength, elastic limit and in a general way to ductility have been worked out. The Shore device is easiest to operate and is the quickest to give results. It is particularly applicable to cold rolled material and to determining the proper shape of new material. It may be used, for example, to determine how to temper a tool and how to shape the nose of it to get the best results. It would seem to be useful for indicating segregation; also for testing tempered steel where other methods would spoil the material.

There are some cases, the speaker said, to which the scleroscope is probably not so well adapted as some other devices; for example, in the testing of case-hardened bevel gears, as for automobiles. Many of these have a case as thin as 1-64 in. The Shore instrument gives the skin hardness of gears, but that is not sufficient, as in time the skin wears off. In the case of dies for drop forgings the scleroscope test may show good hardness on the surface, but it is important to know how the hardness varies through every 1-100 in. beneath the surface. The same might be said of projectiles. As to rails, some tests have been made in Germany by the Brinell method, but they have not been extensive enough for deductions. It has been variously stated that elasticity and resilience, and, again, brittleness, are the qualities tested by the scleroscope. Dr. Dudley had said that springs would need to be tested for resilience by a method that would not destroy the springs themselves; and if the Brinell or the Shore method could give an idea of resilience as affected by heat treatment a very useful purpose would be served. Speaking of the cutting quality of metal as indicated by the Keep machine, Dr. Stoughton said that those who sell it say that the dullness of the drills makes no difference. He had not found it so. The drill can be used but once or twice without resharpening. As to the divergence of results on alloys as tested by the scleroscope, he suggested that the instrument might be fitted with a microscope so as to test in turn the hard constituent and the soft matrix of certain alloys. While the International Association for Testing Materials had done considerable work in laboratory testing, its tests were not so voluminous in the practical operations of industrial works. Therefore the American Society for Testing Materials might well have a committee to carry on work in these practical applications of hardness testing.

CORROSION AND PRESERVATIVE COATINGS

The present convention yielded less striking contributions than some of its predecessors to the literature of preservative coatings and the corrosion of iron and steel. The relative corrosion of wrought iron and of steel, for example, is a quiescent subject. As to preservative coatings for structural materials developments are not likely to be important pending the service tests now under way at Atlantic City and Pittsburgh.

Report on Preservative Coatings

S. S. Voorhees, chairman of Committee D1, on Preservative Coatings for Structural Materials, reported in general as to the work of the committee, and the chairmen of various sub-committees reported progress. The inspection of the Havre de Grace Bridge, on which are panels representing 19 paints, showed that after four years the protection afforded is still satisfactory in a great majority of cases. Important changes are on the eve of occurring in some

of the panels, the committee thinks, but the time has not yet arrived for photographing or for removing the films. There has been an inspection of the wooden panels at Atlantic City, but more time will be required for definite conclusions. From the sub-committee on Linseed Oil it was reported that the manufacturers of such oil think more work should be done on different crops of seed before deciding on specifications. Some difference of opinion was said to exist as to the amount of rosin permissible in boiled linseed oil. For the sub-committee on the Influence of Paints on Corrosion it was reported that samples of 10 commercial pigments will be selected and sent to the members of the sub-committee for investigation.

Concerning the Havre de Grace Bridge tests, Chairman Voorhees said that the paints on the specially prepared plates were not in as good condition as those covering the members of the bridge. The statement that these plates were pickled brought out the remark from one member that the Pennsylvania Railroad no longer pickled metallic surfaces preparatory to painting. The effect on the surface of a steel plate due to the liberation of hydrogen in pickling was referred to in this connection. The point was also made that, while black scale tightly adhering to a plate constitutes a protection, it is well to remove loose scale before painting.

G. W. Thompson read a brief paper on "Another Solubility Test on Protective Coatings," adding to the information he presented on this subject last year. He described tests with two paints to determine their solubility. The surface covered by one showed, under the spraying with water to which both were subjected, the formation of a scum or organic compound. This compound, it would appear, may account for the washing and streaking of some paints. The experiments are being continued on wood, steel and galvanized iron to determine whether the formation of such soluble compounds, affecting very considerably the durability of the coating, depends in any way on the surface painted.

The Corrosion of Iron and Steel

Dr. Allerton S. Cushman presented the report of Committee A5 on the Corrosion of Iron and Steel, saying that its work in the past year had consisted in the care and supervision of the wire fence panels at Pittsburgh, and the official inspection of the steel panels at Atlantic City. There has not been time enough to justify a report on the former; therefore the committee's report, of which a synopsis is given below, deals with the steel panels put up at Atlantic City in the fall of 1908.

The first official inspection of these panels was on April 15, 1910, and was conducted by a committee of seven. Each plate was given two separate marks, graded upon a scale of 10—one mark to signify the condition of the plate as far as corrosion effects were discernible, and the other to grade as nearly as possible the condition of the protective coating. Account was taken of chalking, checking, cracking, scaling and color. The object of the Atlantic City panel tests was to determine whether the results under service conditions bear any relation to the respective inhibition and stimulative effects of certain pigments as shown in the laboratory water tests previously conducted. These latter tests consisted in immersing samples of steel in water suspensions of the various pigments and blowing air through the containers for definite periods of time, the corrosion being measured by the loss in weight sustained by the test pieces.

The committee is of the opinion that the steel panel tests have not gone far enough to warrant definite conclusions. It considers it probable that in time many plates that are at present in good condition will begin to fail and fall below others which now show slight deterioration. One thing is already apparent, however, and that is that "those pigments whose protective value depends upon the principle of chromate inhibition, as well as those which produce basic reactions in water suspensions, have given a good account of themselves on the steel panels." The committee reported the 18 pigments (out of 50 used on the panels) employed in both the water and panel tests, which received an average mark of 8 or over in the panel inspection of April 15. It says that of the 18 only 5 are exceptions to the above statement concerning the good results with chromates and pigments giving basic reactions in water suspensions. There were six duplicate panels for each of the single pigments. The committee, therefore, decided that the inspection would be more thorough if half the paint film on each plate of one set were removed, so that the condition of the surface underneath the paint could be examined. These panels were brought into the convention hall and were generally inspected. The 18 pigments common to both tests, which received an average mark of 8 or over, are the following:

	Average.
American vermilion (chrome scarlet)	9.8
Chrome green (blue tone)	9.8
Zinc barium chromate	9.7
Sublimed blue lead	9.6
Sublimed white lead	9.5
Zinc lead chromate	9.5
Zinc chromate	9.4
Bright red oxide	9.3
Prussian blue (water stimulative)	9.2
Natural graphite	9.1
Orange mineral (American)	9.0
Medium chrome yellow	9.0
White lead (quick process)	8.9
Willow charcoal	8.8
Prussian blue (water inhibitive)	8.8
White lead (Dutch process)	8.7
Red lead	8.7
Zinc lead, white	8.0

The Painting of Cement and Concrete Structures

The paper of Charles McNichol, Washington, D. C., on the above subject was given an appreciative hearing, since as a master painter he put at the disposal of the society and his craft a method of preparing the surfaces of cement and concrete structures for painting. It consists in treating the cement surface with a solution of zinc sulphate and water, mixed equal parts by weight and applied with a bristle brush after the cement is dry. If 48 to 72 hours is allowed as a drying period this treatment will make a cement wall as safe to paint as an ordinary plaster wall. Incorporated in the paper was a letter from Dr. Allerton S. Cushman, in which it was pointed out that when zinc sulphate is brought into contact with hydrated lime a chemical reaction results in the formation of gypsum and hydrated oxide of zinc. After the surface has become thoroughly dry again it will contain within its pores a mixture of gypsum and zinc oxide, which have no bad influence on linseed oil, and, in fact, are frequently used as paint pigments. The filling of the pores of the concrete has the effect of preventing suction, thus keeping the oil paints from penetrating too deeply into the cement.

Exposure Tests of Paint on Steel

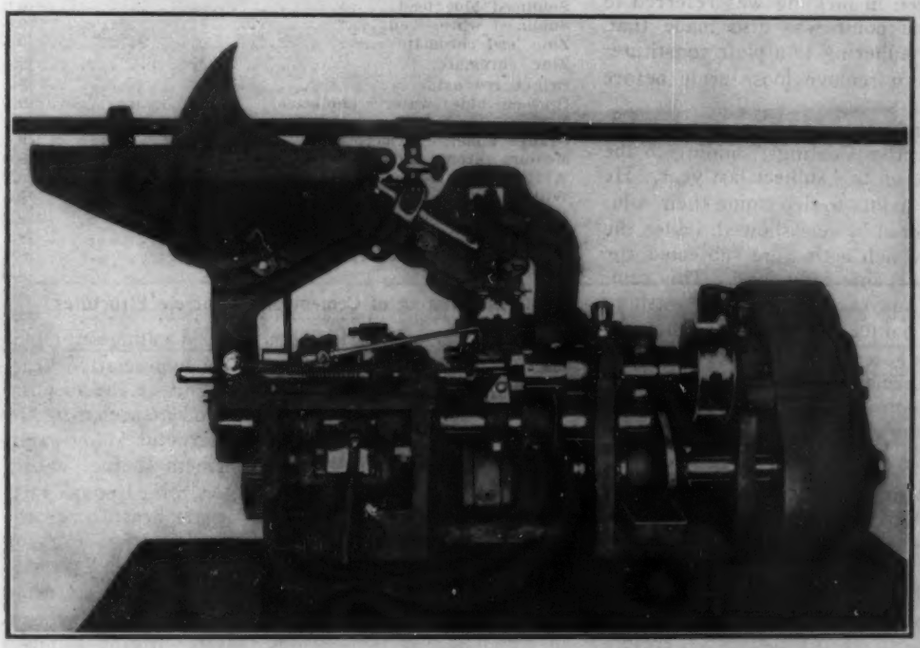
A paper by Cloyd M. Chapman of Westinghouse, Church, Kerr & Co. on "Some Exposure Tests of Structural Steel Coatings" dealt with tests made by the exposure of 1600 steel plates painted with 530 different coatings submitted by 271 manufacturers and dealers. The paper will be given in a later issue. It showed marked differences in the comparative ratings of various pigments after one and two years' exposure. Some which were rated high on the shorter exposure went far down in the scale on longer exposure. The red leads, red lead primers and zinc oxides were rated highest, in the order named, after two years' exposure.

The Alabama Fuel & Iron Company, Birmingham, Ala., has purchased the Russellville Iron Ore & Metal Company.

A New High Speed Wood Screw Threader

A Part of the E. J. Manville Improved Line of Screw Making Machinery

The latest perfected type of wood screw threader built by the E. J. Manville Machine Company, Waterbury, Conn., is one of a complete line of machines for the manufacture of wood and machine screws from blanks made by the cold heading process on the builders' cold headers or rivet machines. The other machines in this line include shavers and slotters, machine screw and bolt, die threaders and pointers. Special study has been given to securing high speed of production, continuous operation and ease of adjustment and durability by the designer, H. P. Townsend, who has had considerable experience in designing this class of machines. This new threader has been developed, therefore, to meet the demand that exists for a faster and more convenient and durable machine than has ever before been produced.



The New High Speed Wood Screw Threading Machine Built by the E. J. Manville Machine Company, Waterbury, Conn.

A few of the most important special features are here described in comparison with the machines in common use. The frail, springy rotary fan hopper, with its irregular and uncertain moving pickup arm has been replaced by a new type of grooved blade fan hopper, which is rigidly mounted and braced, in which the movements are positive and steady, overcoming the snapping of the pickup arm and scattering screws on the floor or in the gears of adjacent machines. The track from the hopper to the cutoff fingers is adjustable for different diameters of screws and the cutoff lever is rigidly mounted directly in line with the end of the track instead of reaching around from the back of the track, like the old type of springy cutoff.

The hopper blade is operated by a friction device which can slip in case anything gets caught, and is provided with a comb or scavenger, which throws all over size or misplaced screws back into the hopper. This complete feed mechanism, as shown in the illustration, is mounted on a single rigid bracket, so that a few extra feed mechanisms may be carried in stock for different sized screws, and when it is desired to change the machine from one size to another, the entire feed can be removed and a new one set in its place by loosening two screws which fasten the bracket to the frame. The cutoff fingers and pickup fingers are made of sheet steel and will be carried in stock.

The back rest, which has always been a source of trouble by the screws and chips collecting behind it, is fully protected, so that this is impossible and will therefore save many breakdowns. The spindle will hold large or small screw heads with an even grip, thereby preventing broken tools and crushed heads. The gripping dies are round and counterbored from the back, so that they may be replaced or changed without removing the spindle from the machine and will run true. They present their gripping surface to the underside of the head, the top of the head being backed up by a plunger which is adjustable from the rear end of the spindle by a set screw and lock nut. This enables the operator to keep the jaws at their most powerful gripping position.

The tool post is short and rigid and is carried on a hollow tool bar, inside of which is mounted the returning spring which, owing to its direct action and its use for this single purpose alone, is many times lighter than the old heavy springs, pulling at an angle at the front of the machine. This, together with the stop collar on the tool bar to receive the bump of the return overcomes broken cams and gears, which in the old machines are of frequent occurrence. The rock lever for rocking the tool in and out of the work is evenly balanced, so that a very light spring is used for rocking and holding the follower stud against the forming shoe, overcoming the severe wear which has always been a source of much inconvenience.

The forming shoe, as shown, is located where it is easily accessible, and may be quickly removed or adjusted, the adjustments being horizontal, vertical and also inclinable for giving the tool proper guidance for cutting a perfect thread, whether the back rest be perfect or worn. The back rest itself may be rocked sideways to take up wear caused by the point of the screw wearing in more than the shank. The pointing tool is carried on a long, stiff, well supported bar and is easily adjustable for giving a perfect point. The pointing is done against the back rest and not with a box tool or hollow mill, thus enabling the threading tool to start threading before the pointing tool is through its operation.

In general, yielding movements are provided wherever necessary to insure against breakage. All wearing surfaces subject to severe use are hardened and easily replaced. The gearing is cut and protected by a casing. All the bearings have bushings to facilitate repairs, and the rigidity, convenience and careful timing of cams, &c., give the machine its rapid production. The first cost of the individual machine is slightly higher than the old style, but the smaller number required and the less operatives necessary bring the first cost and the subsequent operation of a 1000-gross plant far below that of machinery at present in general use.

The Pridmore Core Molding Machine

A New Time Saver for the Foundry

For molding odd shaped cores such as cannot be produced on the usual core forming machines because of their non-uniformity of section, Henry E. Pridmore of Chicago, manufacturer of the Pridmore molding machines, has developed a core molding machine. It is constructed and operated on the same principle as the Pridmore rock over drop machine.

Fig. 1 shows the machine alone, before applying the core box. It will be seen to consist of a heavy rigid stand supporting on a horizontal shaft the frame which carries the core box and two vertical parallel steel uprights upon which the combination draw arms and receiving tables are mounted. These arms are raised and lowered through connecting rods from cranks on a second horizontal shaft mounted near the base of the machine and normally held in their upper position by the action of a tension spring. When it is desired to depress the arms the operator steps on the U-shaped rod extending from the crank arm, depressing it against the resistance of the spring. As soon as the foot pressure is released the arms are returned to their upper position. The core box is attached to the frame directly with screws through the holes in the rocking frame, as shown in the illustrations, or where the boxes must be frequently changed a special arrangement is provided of a slotted plate attached to the under side of the box through which a turn bottom attached to a centrally located cross bar in the frame can be passed and turned to lock the parts together. With this arrangement it requires but a few moments to attach the box to the machine.

In making a core the box is turned to the position shown in Fig. 2, filled with sand and rammed by jolting

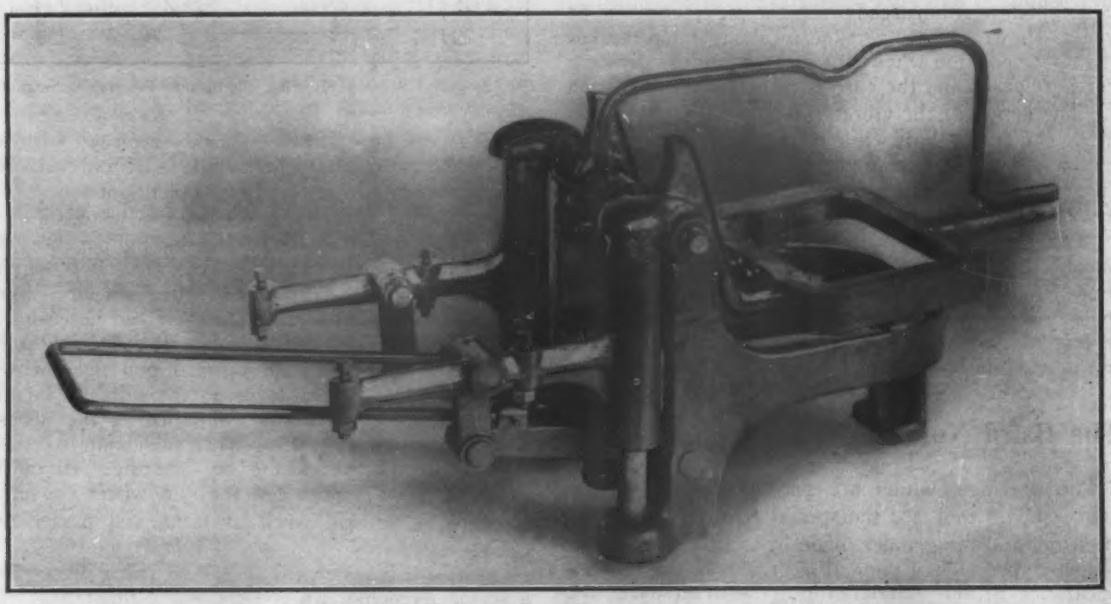


Fig. 1.—The New Rock-over Core-molding Machine Built by Henry E. Pridmore, Chicago, Ill.

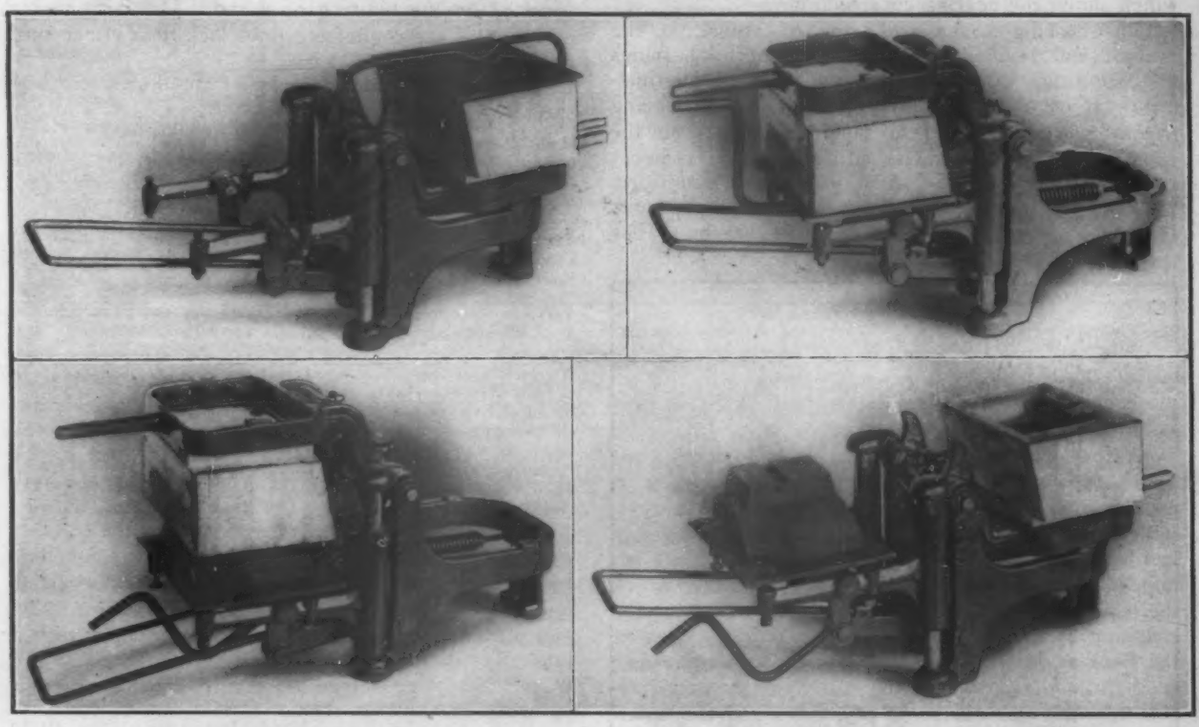


Fig. 2.—The Core Box Filled and Rammed.
Fig. 3.—The Box Rocked Over to the Drawing Position.
Fig. 4.—The Core Drawn Down Out of the Box.
Fig. 5.—The Box Returned Ready for the Next Core.

STAGES IN THE OPERATION OF THE PRIDMORE CORE MOLDING MACHINE.

it on the frame two or three times. The frame is purposely made heavy for this reason. The top board is then put on the box and the clamping rod adjusted on it, so that while the handle of this rod and that of the rocking frame are held together by the operator, the box may be rocked over into the position shown in Fig. 3 without danger of having sand jar out or the cover displaced. The next operation is to lower the drawing lever by stepping on it as before explained, which causes the core to drop away from the box as shown in Fig. 4. The frame is then rocked back to the original position ready for the next core to be made as shown in Fig. 5. The receiving table returns to its upper position when foot pressure on the drawing lever is released and the core is then ready to be lifted off. The action of the vibrator is also automatic. Revolving the frame shaft while the frame is being rocked over causes the air valve to open and vibration continues until the rocking over motion ceases and the core is released from the box.

The rapidity with which the sand can be jolt rammed, the facility with which the core box board is clamped to the box and the box rocked over, and the accuracy with which the finished core is released from the box are among the principal advantages claimed for the machine.

The Baird No. 1 Tool and Die Grinder

The bearings, which are perhaps the most vital part of such a tool, are the special feature of the new No. 1 tool and die grinder made by the Baird Machine Company, Oakville, Conn. Fig. 1 shows the general appearance of the grinder and its countershaft, and Fig. 2 is a detailed sectional view through the spindle, which shows the bearing construction.

The bearing boxes are made of bronze of the composition specified by the Government for bearings and are ring oiling and dust proof. Simple adjustments are provided for taking up wear, the boxes being in one piece and fitted to tapered journals on the spindle, so that an endwise adjustment will compensate for wear. At the same time a more uniform wear is insured and less tendency to wear out of round, or for the spindle to become loose in its bearings. The

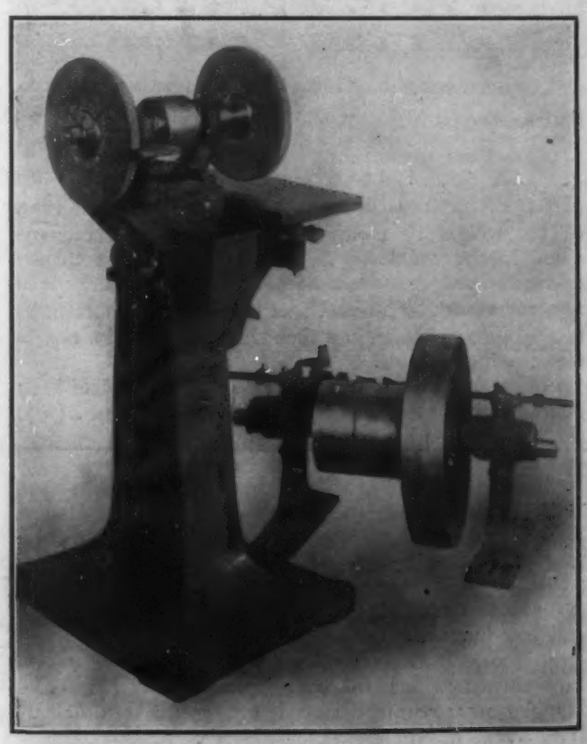


Fig. 1.—The No. 1 Tool and Die Grinder Built by the Baird Machine Company, Oakville, Conn.

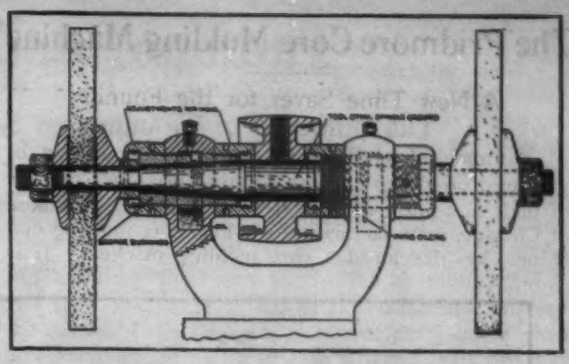


Fig. 2.—Axial Section Showing the Spindle Bearing Construction.

bearings can be easily and quickly replaced with new ones when worn out. The spindle is of tool steel, with taper ground journals, as before mentioned.

Another feature is the very fine adjustment of the table, such as is required for grinding punches, dies, press and automatic machine tools, &c. It is obtained by manipulating the small hand wheel shown in Fig. 1, and the bracket supporting the table can be easily and quickly adjusted vertically, and is released or clamped rigidly in position by an upward pull or downward thrust of the clamping lever on the side. A counterweight for the bracket is contained in the pedestal, which keeps it from falling when the clamp is released, and facilitates the raising or lowering. An adjustable tool post is provided for one wheel, to support tools to be ground, such as lathe and planer tools, chisels, &c.

With the grinder are furnished two emery wheels, a set of wrenches, water tank and countershaft. The latter is provided with a slotted lever shipper and is actuated by the twisting of a rod. The dead center positions of the connecting links lock it in either running or idle position.

Following are the more important dimensions and specifications of the grinder:

Hight from floor to center of spindle, inches	40
Distance between wheels, inches	15¼
Diameter and face of emery wheels, inches	12 x 1
Diameter of spindle, inches	1⅛
Diameter of spindle at wheel, inches	⅞
Speed of grinder spindle, revolutions per minute	2,000
Length of tapered bearings, inches	4
Size of table, inches	10 x 18
Vertical adjustment of table for fine adjustments, inches	1
Vertical adjustment of table for bracket, inches	12⅝
Top of table to center of spindle (table and bracket down), inches	15¾
Diameter and face of pulley, inches	5 x 3¼
Length of countershaft, inches	30
Speed of countershaft, revolutions per minute	550
Diameter and face driving pulley on countershaft, inches	18 x 3¼
Diameter and face tight and loose pulleys on countershaft, inches	8 x 3¼
Floor space, inches	25½ x 24
Weight, grinder only, pounds	485
Weight, complete with countershaft, pounds	585

The grinder is especially recommended for toolroom use or for general purposes, such as the grinding of punches, dies, automatic machine tools, lathes and planer tools, chisels, &c.

The United Metal Trades Association of the Pacific Coast, in its *Bulletin*, dated June 25, notes slight changes in the machinists' strike. In Seattle several new men have been put to work and some of the old ones have returned to their jobs. In Tacoma conditions are slightly more in favor of the employers. In Portland no more men have struck and a few new ones have been secured, so that a little gain is shown there. The reports from all localities affected by the strike indicate that the members of the association are more determined than ever to maintain the open shop and the nine-hour day. The statement is made that open shop pattern shops are now in operation on the Pacific Coast, one being in Portland and one in Seattle.

Titanium and Segregation*

The Influence of Titanium on Segregation in Bessemer Rail Steel

BY G. B. WATERHOUSE.

Segregation is one of the important questions before the steelmaker. It is, therefore, natural that for many years it should have engaged the attention of iron and steel metallurgists in different countries and have given rise to an important literature. The author greatly regrets that, owing to lack of time, he is unable to review this literature and bring together the more important findings. Herewith are presented the results recently obtained by him on segregation in acid Bessemer rail steel. They point in the same direction as those published in 1905 by Talbot, which showed the important influence of aluminum in greatly retarding segregation in certain cases.

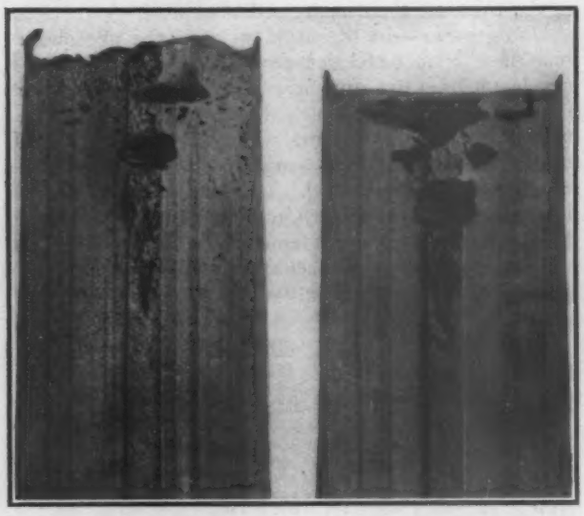


Fig. 1.—Ordinary Steel Ingot. Fig. 2.—Titanium Steel Ingot.

In the present instance titanium, when rightly applied in the proper amount, is also found to retard segregation of sulphur, phosphorus and carbon, in what is normally quiet, quick-setting steel. In all commercial steels the bulk of the ingot must be used, and it is believed that the results given below are of importance, showing as they do one way in which segregation may be considerably controlled.

Results with Ingots

The ingots used were from an ordinary rail steel heat, and from a heat to which had been added 64 lb. of ferrotitanium, which amounted to only 0.25 per cent. of the weight of the heat. The ordinary steel was made in the usual way. After the heat was turned down, the proper amount of molten spiegel was poured into the vessel. The heat was held there a short time, poured into the ladle, and then through a 1½-in. nozzle into the ingot molds.

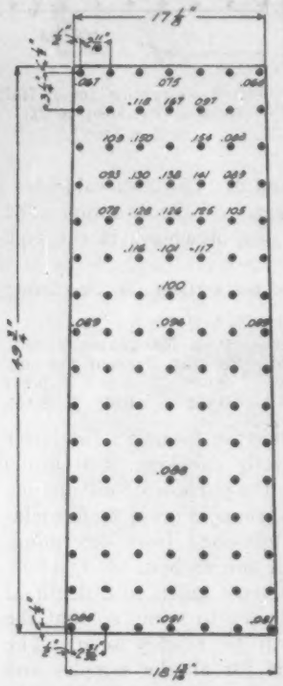


Fig. 5.—Normal Ingot, Half Section. — Phosphorus in Ordinary Steel.

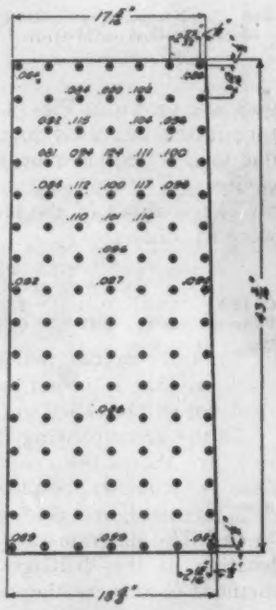


Fig. 6.—Titanium Ingot, Half Section. — Phosphorus in Titanium Steel.

There were six molds. After three ingots had been poured, a ladle test was taken. The third ingot of the six was allowed to cool while still standing on its stool and was then cut through longitudinally.

The heat in which ferrotitanium was used was made in exactly the same way. As the steel was poured into the ladle, the alloy was shoveled in; the heat was then held in the ladle for 3 min. before pouring the ingots. In this case also, the third ingot of the heat was cooled in an upright position and cut through longitudinally. An analysis of the ferrotitanium gave:

	Per cent.		Per cent.
Carbon	10.50	Silicon	1.60
Titanium	11.60	Manganese	0.30
Iron	74.12	Calcium	Trace

The photographs of the ordinary and titanium in-

* Read before the American Society for Testing Materials, Atlantic City, N. J., June, 1910.

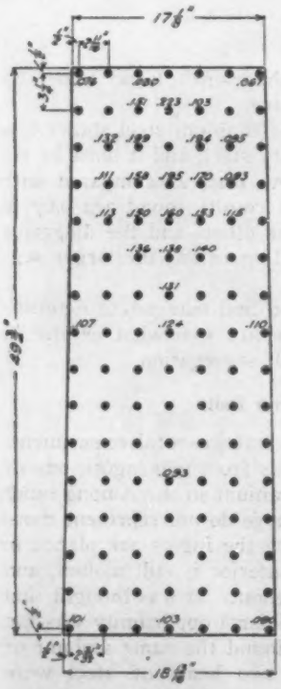


Fig. 3. — Normal Ingot, Half Section.—Sulphur in Ordinary Steel.

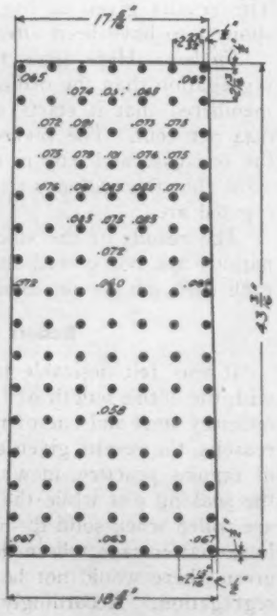


Fig. 4.—Titanium Ingot, Half Section.—Sulphur in Titanium Steel.

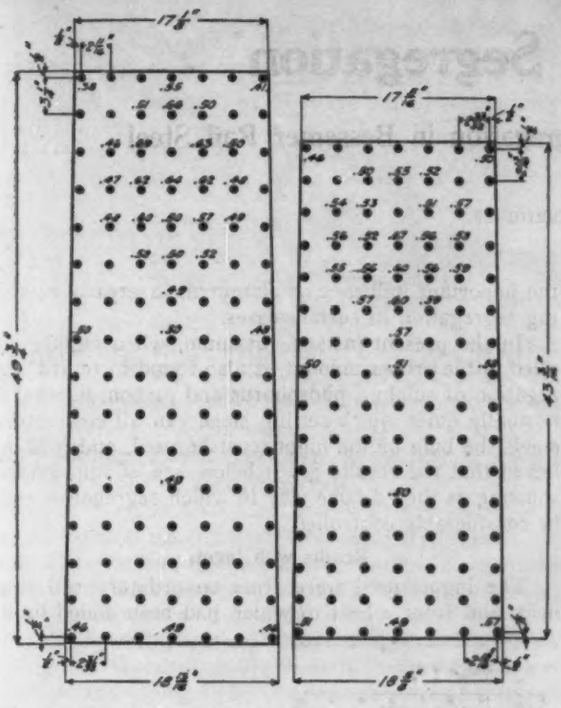


Fig. 7.—Normal Ingot, Half Section.—Carbon in Ordinary Steel.

Fig. 8.—Titanium Ingot, Half Section.—Carbon in Titanium Steel.

gots are shown in Figs. 1 and 2. The noticeable feature is the increased soundness of the titanium steel due to the concentration of the blowholes in the pipe cavity.

The analyses of the ladle tests from the two heats were as follows:

	Carbon. Per cent.	Sulphur. Per cent.	Phos. Per cent.	Manganese. Per cent.	Silicon. Per cent.
Ordinary steel	0.44	0.098	0.088	0.91	0.117
Titanium steel	0.47	0.068	0.093	0.95	0.118

No trace of titanium could be found in the latter steel, so that it is not, strictly speaking, a titanium steel, but will be called so for the purpose of distinction.

In the accompanying diagrams, Figs 3 to 8, inclusive, are shown the results obtained from determinations for sulphur, phosphorus and carbon. A 13-16-in. drill was used, and drillings were taken to a depth of ⅝ in. The diagrams are drawn to scale, so that the location of the drillings can be readily seen. The methods used were the same for all the samples and all the determinations were made by one man. The results are briefly considered in order.

Sulphur.—This element segregates the most. In the ordinary steel it has risen from 0.098 per cent. in the ladle test to a maximum of 0.223,and there is a considerable area with more than 0.147, which is 50 per cent. more than the ladle test. In the case of the titanium ingot, the contrast is very remarkable. The greatest result is 0.101, which is not quite 50 per cent. more than the ladle test, 0.068, and the segregated area is very much smaller than in the case of the ordinary ingot. It is true that there are two factors which may partly account for this difference in results; the titanium ingot is somewhat smaller, and there is less sulphur in the steel as a whole. The fact remains, however, that there is much less segregation of sulphur in the titanium than in the ordinary steel.

Phosphorus.—In the ordinary steel the phosphorus has risen from 0.088 per cent. in the ladle test to a maximum of 0.167, and here also the segregated area is seen to be considerable. In the titanium steel the maximum is 0.124, starting with a ladle test of 0.093, and the segregated area is more restricted than in the case of the ordinary steel. The ordinary steel is in a better condition to start with than the titanium steel, as it has slightly less in amount (0.088 as compared with 0.093), so that the behavior of the phosphorus is a good test of the preventive power of the titanium.

Distance from Top of "A" Rail.	Carbon, per cent.		Sulphur, per cent.		Phosphorus, per cent.		Silicon, per cent.		Manganese, per cent.	
	Titanium.	Ordinary.	Titanium.	Ordinary.	Titanium.	Ordinary.	Titanium.	Ordinary.	Titanium.	Ordinary.
0′2″	0.52	0.49	0.042	0.041	0.094	0.090	0.154	0.158	0.91	0.93
1′2″	53	47	042	038	092	097				
2′2″	53	49	042	039	093	093				
3′2″	53	49	044	041	092	092				
4′2″	52	49	044	039	094	089				
5′2″	53	48	044	041	094	091				
6′2″	53	47	042	040	096	093				
7′2″	54	47	043	042	096	092				
8′2″	54	48	042	041	099	095				
9′2″	54	48	042	041	095	091				
10′2″	54	50	043	050	099	088	161	177	93	97
11′2″	55	52	043	048	100	088				
12′2″	54	51	043	046	101	094				
13′2″	54	50	045	054	102	104				
14′2″	54	50	044	051	100	094				
15′2″	54	51	043	054	102	102				
16′2″	54	47	045	051	100	114				
17′2″	54	48	045	053	103	106				
18′2″	55	49	044	046	096	114				
19′2″	55	47	043	048	093	104				
20′2″	55	46	044	046	101	101	160	167	95	99
21′2″	54	47	043	048	095	107				
22′2″	54	46	043	049	098	105				
23′2″	54	54	044	054	101	108				
24′2″	54	55	044	050	100	098				
25′2″	54	54	044	051	102	097				
26′2″	54	56	045	051	100	100				
27′2″	54	53	043	051	101	102				
28′2″	56	52	045	050	104	107				
29′2″	54	52	045	051	100	100				
30′2″	54	53	046	051	098	104	160	172	95	97
31′2″	55	52	046	048	103	102				
32′2″	56	52	049	051	101	104				

Table I.—Analyses of A Rails.

Distance from Top of "A" Rail.	Carbon, per cent.		Sulphur, per cent.		Phosphorus, per cent.		Silicon, per cent.		Manganese, per cent.	
	Titanium.	Ordinary.	Titanium.	Ordinary.	Titanium.	Ordinary.	Titanium.	Ordinary.	Titanium.	Ordinary.
33′8″	0.54	0.52	0.047	0.050	0.098	0.098				
35′2″	56	51	046	049	096	112				
36′8″	55	52	045	050	096	110				
38′2″	55	51	045	043	101	096				
39′8″	54	52	046	050	100	102				
41′2″	54	51	045	051	099	106				
42′8″	54	52	045	046	103	110				
44′2″	55	52	045	051	106	104	0.170	0.158	0.96	0.95
45′8″	56	53	045	048	105	100				
47′2″	54	53	043	048	103	105				
48′8″	55	....	045	....	098	....				
50′2″	55	53	045	048	103	100				
51′8″	54	53	043	048	095	101				
53′2″	55	53	042	047	106	102				
54′8″	54	52	041	047	094	096				
56′2″	54	53	044	047	100	100				
57′8″	52	53	044	047	098	101				
59′2″	50	53	040	047	098	101	157	166	97	94
60′8″	52	52	041	047	098	106				
62′2″	50	51	041	047	096	102				
63′8″	52	52	042	040	096	100				
65′2″	53	53	043	052	097	099				

Table II.—Analyses of B Rails.

The results given in the diagrams (Figs. 5 and 6) show it to have been effective.

Carbon.—Here again the titanium steel shows less segregation than the ordinary steel, and it must be remembered that it starts with 0.47, as compared with 0.44 per cent. The highest results found are 0.67 in the one case and 0.69 in the other, and the diagrams show that the ordinary steel again has the larger segregated area.

The results of the silicon and manganese determinations are not given; they are somewhat erratic in each case, but do not exhibit segregation.

Results with Rails

It was felt desirable to make careful experiments with the entire length of rails from two ingots, one of ordinary steel and one of titanium steel. Among other reasons, the results given above do not represent those of regular practice, in which the ingots are placed in the soaking pits while the interior is still molten, and are rolled when solid throughout. It was thought that in the latter case, where the same opportunity was not given, there would not be found the same amount of segregation. Accordingly, two heats of steel were made as nearly as possible under the same conditions, except that in one case 75 lb. or 0.3 per cent. of ferrotitanium was used, and the steel held for 3 min. in the

ladle before pouring. In each case the third ingot of the heat was taken. The ingots were three-rail length, and the section rolled was the Dudley 100-lb. rail. The rails were marked A, B and C, being respectively the top, middle and bottom rails from the ingots.

The drillings for analysis were obtained in the side

Distance from Top of "A" Rail.	Carbon, per cent.		Sulphur, per cent.		Phosphorus, per cent.		Silicon, per cent.		Manganese, per cent.	
	Titanium.	Ordinary.	Titanium.	Ordinary.	Titanium.	Ordinary.	Titanium.	Ordinary.	Titanium.	Ordinary.
66′8″	0.51	0.53	0.041	0.050	0.097	0.100				
68′2″	54	53	042	051	099	098				
69′8″	51	52	042	049	099	099				
71′2″	52	52	041	052	092	092				
72′8″	50	52	042	057	092	096				
74′2″	50	52	041	053	093	098	0.172	0.172	0.92	0.93
75′8″	51	52	041	053	093	090				
77′2″	51	52	040	050	095	088				
78′8″	53	51	041	049	101	086				
80′2″	52	52	041	047	100	084				
81′8″	52	53	040	046	098	092				
83′2″	52	53	040	048	104	087				
84′8″	52	53	041	050	098	098				
86′2″	53	53	040	053	090	093				
87′8″	53	54	040	052	102	095				
89′2″	53	53	039	048	104	096	147	141	90	99
90′8″	51	53	039	052	092	098				
92′2″	51	53	040	052	095	094				
93′8″	51	52	040	050	099	095				
95′2″	50	53	040	053	102	090				
96′8″	51	51	039	042	092	084				
98′2″	51	52	040	044	091	086				

Table III.—Analyses of C Rails.

of the head with a 13-16-in. drill, going well past the center in each case, and to a uniform depth each time. Beginning 2 in. from the top of the A rails, drillings were taken every 12 in., and in the B and C rails, every 18 in.

The analyses of the ladle tests of these two heats were as follows:

	Carbon. Per cent.	Sulphur. Per cent.	Phos. Per cent.	Manganese. Per cent.	Silicon. Per cent.
Ordinary steel	0.49	0.044	0.102	0.92	0.162
Titanium steel	0.51	0.041	0.102	0.92	0.172

The results obtained on the drillings are given in Tables I, II and III. In the case of each rail, the distance given is from the top of the A rail.

In this case also it is seen that the use of ferrotitanium has lessened the segregation. The sulphur in the ordinary steel varies from 0.038 to 0.054 per cent., and in the titanium steel from 0.039 to 0.049. The phosphorus in the ordinary steel varies from 0.084 to 0.114 per cent. and in the titanium steel from 0.090 to 0.105. Lastly, the carbon in the ordinary steel varies from 0.46 to 0.56 per cent., but in the titanium steel only from 0.50 to 0.56.

The use of the alloy, therefore, has brought about much more uniformity in the steel, and, as remarked before, has lessened the segregation.

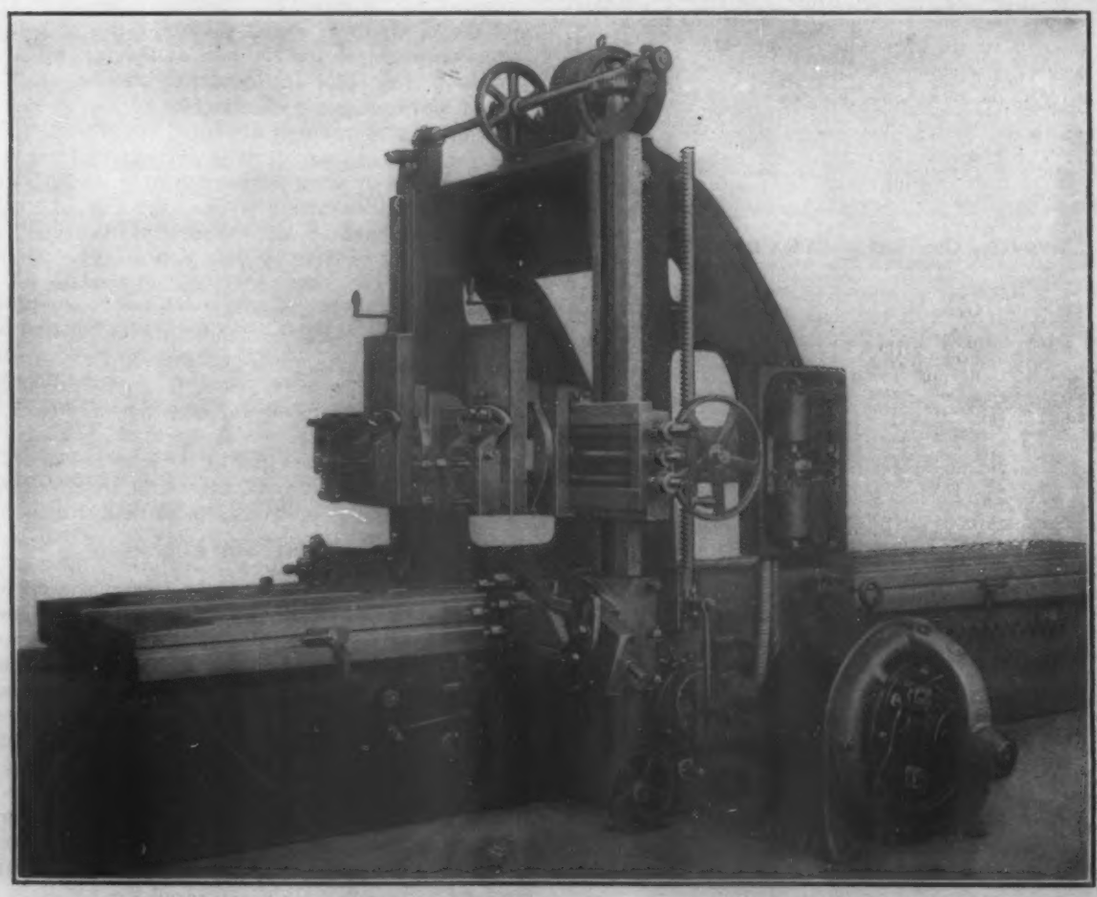
Improved Drive for Large Pond Planers

Power Supplied by a Reversible Variable-Speed Electric Motor

The larger a planer the more difficult does it become to drive and return its table without excessive waste of power or the use of somewhat complicated mechanism. In a new type of drive developed by the Pond Works of the Niles-Bement-Pond Company, New York, the common practice of accomplishing the reversing between the platen and the source of power has been departed from, and the reversing is done in the driving motor itself. The control, both for variation of cutting speed and reversing for the return speed is entirely through electrical means. Cutting speeds of between 25 and 40 ft. per minute are provided and return speeds of about 60 to 100 ft. per minute for moderately large planers and of between 55 and 90 ft. for the largest sizes. The minimum length of stroke that the platen can make is 2 in., and the platen can be stopped within a limit of ⅛ in.

The Platen Action and Control

The reversible electric motor, having a speed range of 4 to 1, or from about 200 to 1000 rev. per min., is



A 48 x 48 In. by 18 Ft. Planer with Reversing Motor Drive Built by the Pond Works of the Niles-Bement-Pond Company.

directly coupled to the shaft carrying the platen driving pinion. The motor switch panel is mounted on one of the housings, as shown in the engraving, and is connected with a pilot switch mounted on the bed of the machine. Through the combination the speed and direction of the table travel are controlled. On the controlling panel are four solenoid switches, the contact members of which are made of sheet copper or bar stock that is easily obtainable and bent to shape, so that renewals need entail no serious loss of time. Also on the panel board are two indexed gauges each having 12 different positions corresponding to as many speeds for the cutting stroke and the return stroke. By sliding the gauge knobs to the required positions, given cutting and return speeds are obtained. These gauges through resistance regulate the armature and field strength.

The pilot switch is entirely enclosed, is only 6 in. in diameter and is located on the planer bed, where the hand lever control common to belt driven machines is usually placed. It is tripped in the usual way by adjustable dogs on the edge of the platen, and by its movement electrically operates the controller on the housing. The pilot switch can be operated by hand instead of by the reversing dogs, giving the operator immediate control of the cutting speed from the minimum up to that for which the controller gauges are set. Similarly the return speed may be governed. This ability to vary speeds in the middle of a stroke is especially of advantage when planing castings with hard spots, thin walls, &c., or a line of castings which may vary in hardness of metal. In such cases the cutting speed is set to that most suitable for the average or soft castings, and as the tool is about to encounter the harder metal or thin walls, the pilot switch is shifted by hand and the minimum cutting speed is immediately obtained and is maintained until the pilot is returned to its former position.

To stop the platen at any particular point, the operator throws the pilot switch to the middle or off position, and the platen comes to rest within a limit of ⅛ in. The speed with which the control lever is shifted does not affect the proper control of the motor. On account of the controller's automatic action it is impossible to reverse the direction of the motor's rotation until its speed is diminished to a safe amount. It is claimed that this not only effects a power saving of nearly 100 per cent. at the instant of reversal, but saves the current supply line from any voltage surge or pumping action.

Advantages Over Belt or Clutch Driven Planers

The builder gives the following arguments to support the contention of the superiority of this type of drive over others: In the belt-driven planers a continual variation of stroke or cutting speed and of useful power is taking place as a result of variation in belt tension and belt surfaces in contact. Where a planer is driven by a motor through friction clutches, the efficiency of the friction surfaces is affected by oil, moisture and heat, so that planers with this type drive are subject to the same variations in cutting speed and useful power as belt-driven planers. In either of the foregoing types there is the attendant element of slip at the time of reversal. Slip in the transmission of power is a direct loss, not only of the power, but in expense occasioned by the necessary replacement of belt or frictional surfaces through wear. In the new Pond drive the direction of the platen stroke is changed, not through shifting belts or clutches, but by reversing the direction of rotation of the motor. The absence of friction surfaces eliminates all the disadvantages inherent to belt or friction clutch drives. Maximum efficiency is secured by the instant availability of the speed best suited to the work, and overhead crane service is facilitated by the absence of vertical belts and countershafts.

The Williams Ratchetless-Ratchet-Rench

To explain the apparently contradictory name of the new drop-forged wrench recently patented by J. H. Williams & Co., Brooklyn, N. Y., it acts like a ratchet wrench, but contains no ratchet mechanism. The idea will be quickly understood from the illustrations, Fig. 1 showing the general appearance of a double-ended wrench of the type and Fig. 2 a diagram of its action in use.

When pressure is exerted on the handle of a wrench there are only two points of contact between the nut

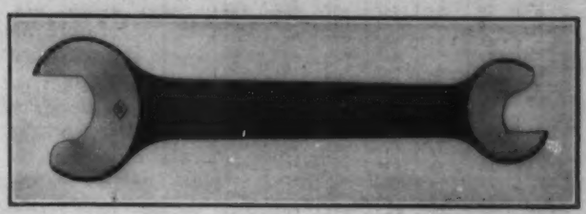


Fig. 1.—A Solid Wrench of a Form That May Be Used Like a Ratchet Wrench, Made by J. H. Williams & Co., Brooklyn, N. Y.

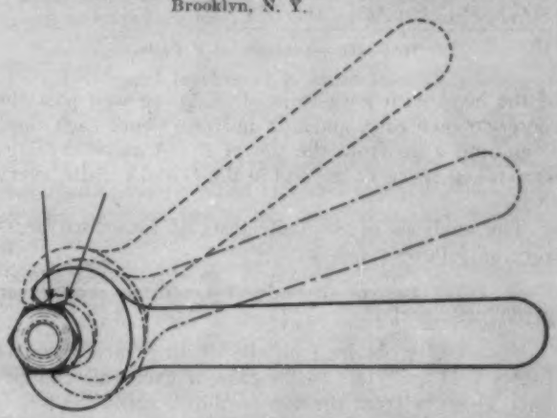


Fig. 2.—Diagram of the Action of the Williams Ratchetless-Ratchet-Rench.

and the jaws; these are at the outer end or point of the advancing jaw and the heel of the following jaw. Obviously the point of the latter can be cut away without destroying the effectiveness of the wrench. It still can be used in either direction, but must be turned over for opposite rotation. The advantage of the modification comes in when the wrench is on its idle stroke, for, instead of retracting it from the flats of the nut after the manner of an ordinary solid wrench, the handle is simply swung back as with a ratchet wrench, and the short jaw rolls on the flat with which it is in contact, releasing the other jaw from the opposite flat. Further movement of the handle attended with slight pressure toward the nut allows the sho t jaw to slide as soon as the nick at its base is free. When the long jaw comes in contact with the next flat of the nut the short jaw hooks the corner diametrically opposite the one in contact with the point of the long jaw and a reverse rotation of the handle causes the nut to turn.

The new wrench is claimed to work with imperceptible wear on the nut or tool; there is nothing to get out of order and its action is materially more rapid than that of a solid wrench. The wrench is made in a variety of sizes. Sizes now in stock are adapted to engage at their smaller ends a tire lug, a 9-16-in. set screw and ⅜-in. cap screw, and at their larger ends a spark plug, a ½-in. United States standard bolt and a ⅝-in. cap screw. Sizes for ¼ to ¼-in. bolts and ¼ to 1-in. cap screws are now in preparation, and other sizes will be made to order in reasonable quantities.

The American Shipbuilding Company is building a forge shop at its Lorain, Ohio, plant. The shop will be 60 x 200 ft., of concrete and steel. A 4500-lb. hammer will be installed for heavy forging work.

De Laval High Efficiency Centrifugal Pumps

The Principles of Design and Their Selection for Various Services

The requisites of a centrifugal pump are that it shall give the required capacity at the required head and with the specified speed, and do the work efficiently. In the development of the designs of the De Laval Steam Turbine Company, Trenton, N. J., much has depended on analysis of tests made upon pumps previously built. This enables predicting accurately the performance of a new pump, even where the service is quite out of the ordinary.

The efficiency obtainable is influenced by the speed at which the pump is to be run, the capacity, the head and the characteristics desired. In calculating efficiencies the total head generated is taken as the suction head measured at the entrance to the pump, plus the pressure head measured at the discharge, plus the difference in level of the two gauges, plus the gain in velocity head between the two points where the gauges are connected.

Characteristics of Centrifugal Pumps

The accompanying diagrams, Figs. 1 to 8, show characteristic curves of De Laval centrifugal pumps of several sizes, designed for different classes of service. Each diagram contains three curves, which indicate the head developed, the power required and the mechanical efficiency developed throughout the range of output or capacity of the pump. These three curves show accurately what the pump will do under any given conditions.

The characteristics of a pump of improper design are shown in Fig. 9. While the efficiency of this pump is fairly good for the capacity, its other features render it unsatisfactory. The pump generates at no delivery a head of about 215 ft., but when delivery begins, the head rises until, at a delivery of 300 gal. per min., it is over 260 ft., after which it falls. The greatest efficiency is obtained at an output of about 450 gal. per min., which is therefore the delivery at which the pump should be rated. The head generated at this output at the speed corresponding to the chart is about 235 ft., which should therefore be the working head. However, if the head at no delivery is only 215 ft., the pump would not, when working against a static pressure, such as that in a standpipe, begin to deliver until the speed had been considerably increased or a by-pass opened. After getting the delivery up to the desired amount, the speed could then be reduced or the by-pass closed, but the pump would be left in a state of unstable equilibrium, and if it should lose the flow, would not be able to regain it.

More serious still are the defects of the horsepower curve. The power consumed by the pump increases steadily from no delivery up to the maximum tested. This means that if the head on the discharge of the pump be relieved, as when beginning to pump into an empty standpipe, or when there is an exceptional demand for water, the amount of power consumed will be excessive, perhaps sufficient to overload and burn out an electric motor, or to require the use of an unnecessarily large and expensive motor, and in this type of unit the motor is the more costly part.

In each of the diagrams relating to De Laval pumps it will be seen that the horsepower required reaches a maximum at about the delivery corresponding to the maximum efficiency, which delivery is that for which the pump was designed. After this, the power taken by the pump becomes less as the flow increases, so that should the head on the pump be diminished, as through breakage of a pipe line, or other cause, the brake horsepower consumed will actually decrease, rendering overloading of the motor impossible. This automatic protection to the motor is secured, not by the addition of governing apparatus or other contrivances, but by the shaping of the pump passages. This makes possible the use of smaller and less expensive motors and permits selecting a motor having maximum efficiency at the output coinciding with the demands of the pump under normal operating conditions.

Construction of De Laval Pumps

A De Laval single-stage pump consists of the casing, which is divided into top and bottom parts, *a* and *b*, Fig. 10; the impeller *c*, running in the casing; the shaft *d*, supporting the impeller; the packings *e* and *f* around the shaft, preventing the entrance of air into the casing; and the bearings *g* and pedestals *h*, by which the shaft is supported. The water passage from the suction opening to the inlet of the impeller is formed in the lower half of the casing, branching in single-stage pumps, so that water is admitted to both sides of the impeller. The discharge passage is likewise formed in the lower part of the casing and is a continuation of the volute or chamber surrounding the impeller. Water entering the suction opening flows to the inlet opening of the impeller, and in passing through the latter is thrown outward, gaining both velocity and pressure through the action of centrifugal force, and the acceleration experienced in the impeller. In the volute chamber surrounding the impeller, the velocity is gradually reduced to that of the flow in the discharge pipe, and thereby energy of motion generates an additional pressure.

The casings of horizontal pumps, both single-stage and multi-stage, are formed of two parts only; that is, they are split horizontally on the center line of the shaft and both the suction and discharge openings are in the lower half. The top half can be lifted off, as shown in Fig. 11, after which the impeller and all passages are accessible, and the shaft and attached parts can be removed without disturbing the piping or connections or any other part of the machine. There is but one joint in the casing, a plain, flat surface, scraped to a fit and maintained tight by an oiled paper gasket. The construction of the water passages and the volute is such that they serve as heavy stiffening rings to withstand the bursting effect due to the water pressure. Cast iron is used for the casings of all pumps handling noncorrosive liquids or fresh water. If corrosive or abrasive liquids are to be handled, other metals are used, such as acid-resisting bronze, nickel alloys or steel.

The Impeller

As the water passes through the impeller at a relatively great velocity, any irregularities will be highly wasteful of energy. The losses occur within the impeller, depending on the manner in which the stream of water through the passages is handled, and without the impeller, due to friction against the water in which it revolves. The impeller should receive the water without shock, and the water should flow through it without shock or undue skin friction. Shock is due to improper shape of passages, which may also give rise to cavitation and subsequent corrosion. Skin friction is determined principally by the roughness and extent of the passages. It is, therefore, important to have the impeller interior finished, and to make it of a material that will retain its original finish and shape, and, aside from other considerations, the length of the passages through the impeller should be reduced as much as possible.

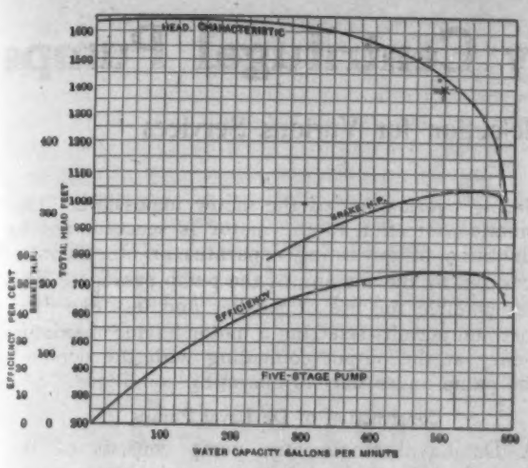


Fig. 1.—Hydraulic Pressure Pump for Steel Mill Service.

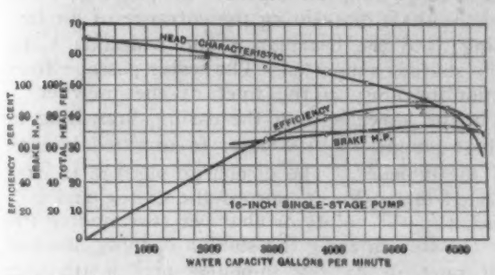


Fig. 3.—Circulating Pump for Barometric Condenser Service.

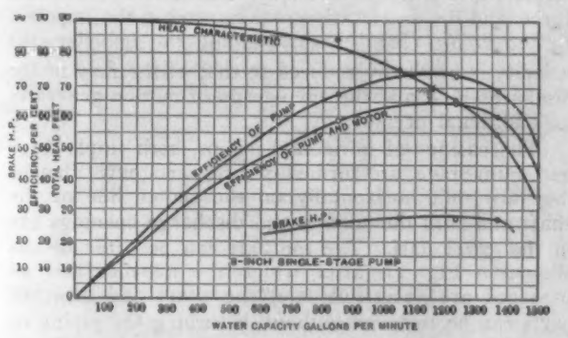


Fig. 5.—Small Motor-Driven Service Pump for Moderate Head.

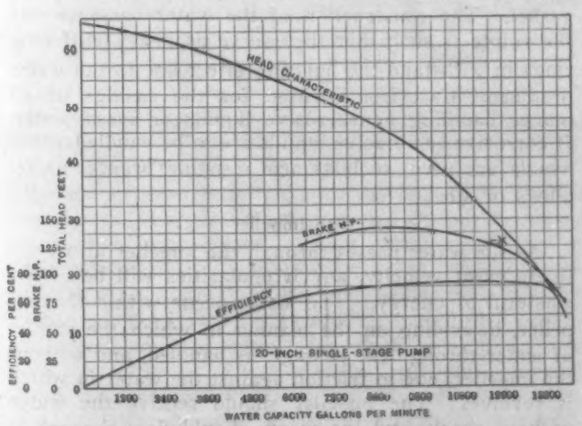


Fig. 7.—Large Motor-Driven Pump for Low Head Service.

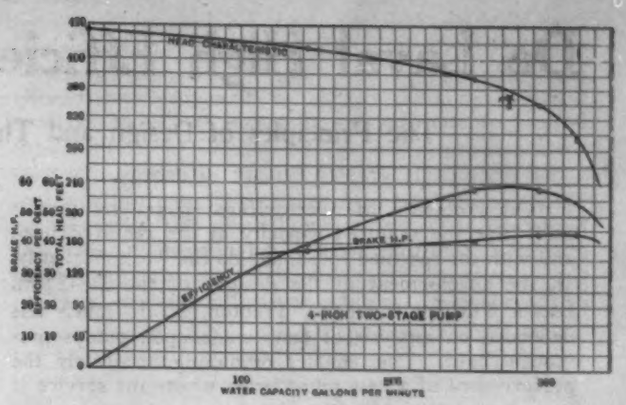


Fig. 2.—Turbine-Driven Boiler Feed Pump.

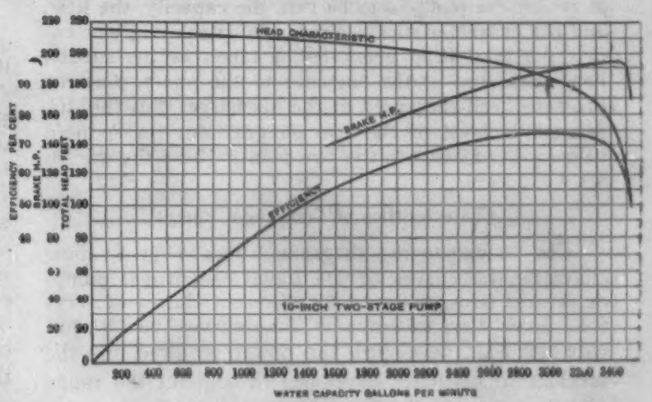


Fig. 4.—Water Works Pump for Moderate Head.

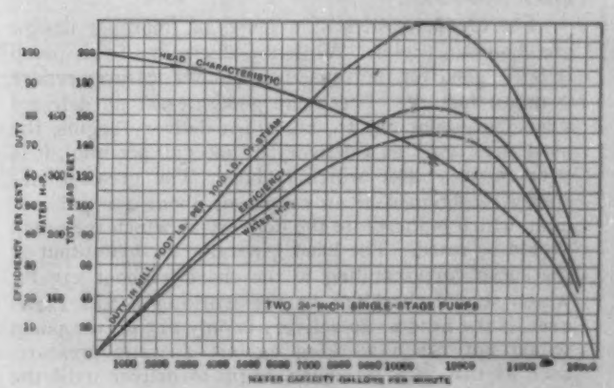


Fig. 6.—Large Turbine-Driven General Service Pump.

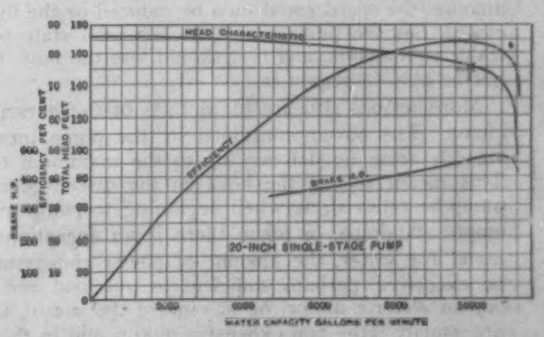


Fig. 8.—Motor-Driven General Service Pumps.

TEST CHARACTERISTICS OF DIFFERENT TYPES OF DE LAVAL CENTRIFUGAL PUMPS.—X INDICATES HEAD AND DELIVERY SPECIFIED.

The energy losses on the outside of the impeller are traceable both to viscosity and to eddies, and their amount, besides depending upon the nature of the surface, increases about as the square of the velocity at which the surface travels through the water. To generate a given head, the periphery of the impeller of a centrifugal pump must run at a definite velocity. Then a square inch of outside surface on the impeller will

meet a certain resistance as it revolves, which, multiplied by its velocity, will represent the rate at which it is wasting energy. Therefore, of two pumps generating a given head, the larger diameter impeller will have a greater number of square inches of surface moving at any given velocity, and will, therefore, waste a correspondingly greater amount of energy. In addition the width of surface between two given velocity limits will be greater as the diameter of the impeller is greater, so that the extent of surface running through the water at a given velocity will increase as the square of the diameter. In other words, the external impeller

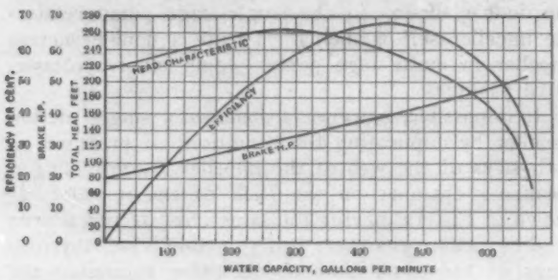


Fig. 9.—Characteristics of a Turbine Pump of Improper Design.

friction for a given head varies as the square of the diameter, so that the small diameter impeller is better.

The open impeller without side plates, that is, the paddle-wheel type, not only gives rise to excessive friction, due to the contact of the rapidly moving water in the impeller with the stationary pump casing, but eddy currents between the edges of the impeller and the case are also set up. The inclosed impeller is not subject to these losses, as the retaining shrouds revolve with the blades and with the contained water. The blades of open impellers must run close to the pump casing to prevent leakage. This trouble is not present with the inclosed impeller, which can be run with any desired clearance. As the velocity gradient between the impeller and the casing can be then distributed over a greater distance, the difference of velocity between adjacent layers of water is less, and, as hydraulic losses increase about as the square of the velocity, the waste of energy is also less.

The impellers of De Laval pumps are bronze, the metal best adapted to withstand the action of water and retain its original shape and smoothness. It also takes a high polish and allows of more accurate castings than can be obtained with iron. The impellers are finished on all surfaces, and the vanes are filed and polished by hand to templets, to obtain the exact theoretical curvature. They are then mounted and balanced for static and running balance at high speed. The double-suction inclosed impeller is used for all De Laval single-stage pumps. It eliminates end thrust and much of the wear and friction on bearings, besides permitting of handling a larger volume with a given diameter of impeller.

The Absence of Diffusion Vanes

De Laval pumps give high efficiencies without dependence upon diffusion vanes to form gradually enlarging passages from the periphery of the impeller to the volute or discharge chamber, the purpose of these passages being to receive the water without shock as it leaves the impeller and to allow it to slow down gradually as it approaches the volute chamber, converting the velocity head into pressure head. When first introduced diffusion vanes happened to increase somewhat the efficiency of the centrifugal pumps then in vogue, but in a properly designed pump they are more harmful than otherwise, since they can be designed to suit only one condition of discharge from the impeller into the diffusion passages. The water leaving the vanes of a centrifugal pump impeller should be directed by the appropriate shape of the casing. Diffusion vanes are correct only when the pump is operated at exactly its rated head and speed; any change in either capacity, head or speed renders them inefficient, for they then obstruct the passage of water, introduce additional skin friction loss and offer chance for solid matter to jam between them and the impeller blades.

The Running Parts and Packing

The shafts are special hammer forged, open hearth steel, turned and ground. All bearings are of the vertically split, babbitt-lined, ring-oiled type, not integral with the pump frame or shaft pedestals, but formed in separate shells resting in the brackets or pedestals. The latter are separate from the pump casing and

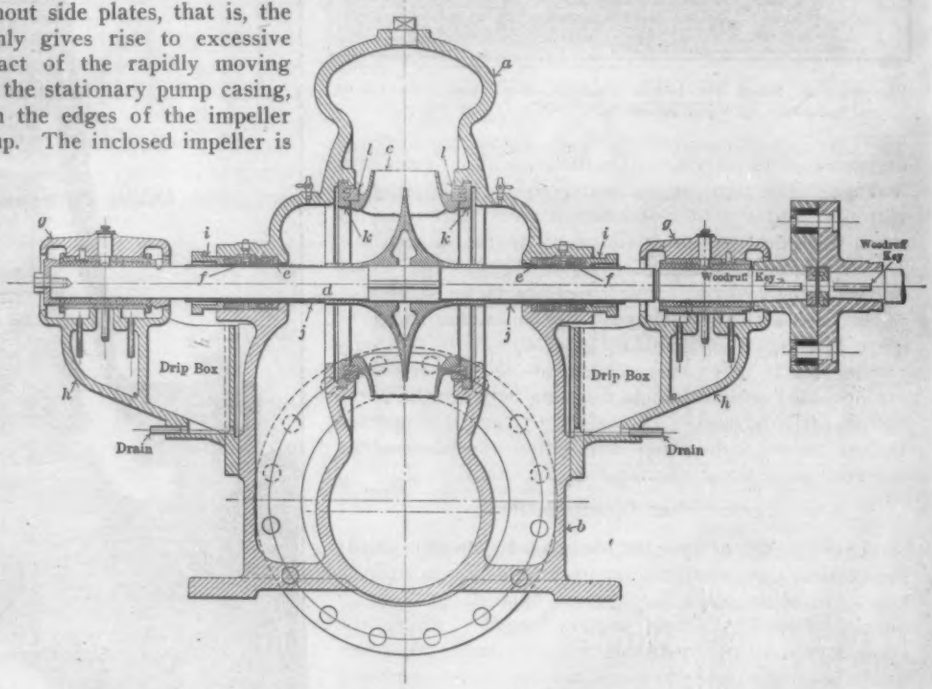


Fig. 10.—Longitudinal Sectional Elevation of a De Laval Single-Stage Double Suction Centrifugal Pump.

stuffing boxes, and no water can leak past the stuffing boxes and find its way into the bearings and oil reservoirs. The separate pedestal also permits removing the bearings for inspection without disturbing the stuffing boxes, pump case cover or other parts of the pump. To prevent the creeping of oil from the bearings along the shaft, the latter is provided with grooves, commonly known as "oil slingers."

Leakage of water out of the pump or of air into the pump along the shaft is prevented by packed glands, *i*, Fig. 10. These contain soft packing under pressure, with a hollow skeleton ring in the middle of the packing, to which water under pressure is admitted, forming an air tight seal and preventing the entrance of air into the suction chamber of the pump and consequent loss of suction. The glands are bronze, split horizontally to allow removing without disturbing other parts of the machine. The shaft at this point is protected from corrosion by a special bronze sleeve, *j*, which extends inward to the impeller and forms a bearing surface for the packing. Any scoring is re-

ceived by the sleeve, which can be easily and cheaply replaced.

Leakage from the discharge chamber back past the impeller to the suction chamber is prevented by the combination of a removable wearing ring *k*, attached to the pump casing and of another removable ring *l*. attached to the revolving impeller. The intermeshing grooves form a labyrinth joint, as is more plainly shown in Fig. 12, and make it possible to maintain high efficiency while developing high pressure per stage. This type of packing permits larger

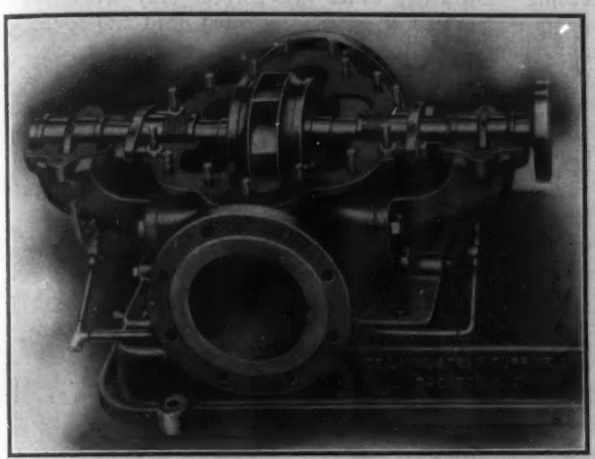


Fig. 11.—A Small De Laval Single-Stage Pump with Cover Removed Showing Accessibility of Internal Parts.

clearance, both axially and radially, without excessive leakage. The path of the water through the rings is tortuous, and the loss of head at each turn prevents rapid flow, besides which the water in the labyrinth is set in rotation, creating a counter centrifugal force opposing the leakage. The rings are made of bronze.

It is practically impossible to maintain three or more bearings in alignment, especially with a rapidly turning shaft. For this reason, all De Laval pumps are provided with a flexible coupling between the pump and the driving motor. The shaft of each is supported by two separate bearings and either mechanism can be removed without dismantling the other.

Vertical Shaft Centrifugal Pumps

The general design and details of construction of the vertical pumps are similar to those of the horizontal type. In some cases the vertical type of machine is furnished with a single suction impeller where the conditions are more suitable for this kind. A lower guide bearing is used to avoid the use of an overhung impeller, which is apt to vibrate and destroy the upper bearing. Both bearings are so arranged that they can be inspected while the pump is in operation, and can be removed without disturbing any part of the pump other than the bearing cap. The sub-base is cut away, so that the lower bearing bracket is fully accessible. In connection with the upper bearing there is a thrust bearing to carry the weight of the running parts of the pump. Hydraulic balance is secured by the design of the pump. All bearings are furnished with special oiling devices and sealed oil drain reservoirs. In case the pump is operated submerged, all waste oil can be piped to an elevation above water level and reclaimed.

Multi-Stage Pumps

A multi-stage pump, such as is shown in Fig. 13, is several single-stage pumps in series, with their impellers in the same casing. Thus, the pressures developed in the several stages are added together and the total head is equal to the sum of the heads generated by the individual stages. The casing is, like those of the single-stage pumps, of two castings only, the passages from the delivery chamber of one impeller to the suction of the next being formed permanently in the solid casting itself.

The impellers of multi-stage pumps are of the inclosed type, and may be regarded as halves of double suction impellers. Water enters the double suction impeller axially from the two sides and the two currents of water join after having been turned into a radial direction; two single suction impellers, as shown in Fig. 12, put together back to back and the dividing wall between the impellers thinned out to nothing toward the periphery, would become a double suction impeller as used in single-stage pumps. The use of the double suction in the single-stage pump renders the impeller self-balancing. To use a double suction impeller in multi-stage pumps would involve complicated passages.

It is possible, however, to balance a single suction impeller by duplicating the conditions of pressure on both sides of the web of the impeller, by providing a balancing chamber on the back of the impeller, as shown in Fig. 12, having the same cross sectional area as the suction chamber, being inclosed by labyrinth rings of the same diameter as those encircling the suction opening. The web of the impeller is pierced

Fig. 12.—Longitudinal Sectional Detail of Impeller and Casing of a Multi-Stage Pump Showing Labyrinth Packing Rings, Shaft Protecting Sleeve and Case Bushing.

by holes connecting the balancing chamber with the suction chamber, so that the static pressure in the suction chamber shall be transmitted to the balancing chamber, also that an extra pressure shall be generated in the balancing chamber approximately equal to the thrust due to the reaction of the axial column of water entering the suction of the impeller. To provide for possible unbalanced end trust, babbitt lined, ring oiled thrust bearings of the marine type, form the supporting bearing.

The multi-stage pump contains an additional water joint, as compared with the single-stage pump, located

where the rotating shaft passes through the diaphragms separating the several stages. This joint, *m*, Fig. 14, is formed between a protecting bronze sleeve keyed to the revolving shaft and a similar sleeve held by the diaphragm. It is long, with small clearance, but there is no rubbing contact and wear does not occur.

Pumps for Special Services and Methods of Driving

The centrifugal pump is used efficiently for handling water under practically all conditions. It is readily adapted to all customary speeds, and can be driven by electric motor, gas or steam engine, steam turbine or belt. Turbine driven pumps may be driven through gears or directly from the turbine shaft. By gears, it is possible to operate the pump at any desired speed, and inasmuch as two gears can be driven from a single spindle, two pumps are easily arranged for parallel or series operation, or both, as desired, a valuable feature where pumps must work against different heads at different times. If pumps are to be directly connected to electric motors, it is important that the speed of the pump should be adapted to the speed of the motor. In general high speed motors weigh less and cost less than low speed motors, and the pump can be designed to meet any speed conditions imposed by motors. Belt driven pumps are similar, except that they are provided with an outboard bearing attached to the bed plate for supporting the shaft beyond the pulley. In large sizes, four bearings are provided and a flexible coupling is placed between the shaft carrying pulley and the pump shaft. This allows the pump to be dismantled without disturbing belt or pulley and protects the pump shaft from distortion due to the pull of the belt.

For mine pumping the De Laval pump possesses the advantages that it occupies little space, does not endanger the motor in case of accidental release of pressure, is easily adapted to work efficiently at different heads, and can be kept in continuous operation for long periods of time without requiring attention to packing glands, &c. For water works pumping service, the pump is entirely suitable, especially where a moderate first cost is important.* The simplicity and durability of the pump enables it to be run by comparatively unskilled labor. It contains practically no packings and can be run continuously 24 hours a day. It also has a large overload capacity and can be speeded up, or changed from parallel to series, to give high pressure for use in fires or for other purposes. Where electric power is available it is frequently more economical to install a motor driven pumping unit than to install a steam plant. By means of electric-driven centrifugal booster pumps, it is possible to supply elevated districts much more economically than by raising the pressure over the entire territory supplied.

For condenser circulating service, absolute reliability is required. Where centrifugal circulating pumps are used to supply barometric condensers, the sloping characteristic curve peculiar to the De Laval pump is valuable, since the pump must start from no flow against a comparatively high head without the assistance of vacuum to lift the water and, after the condenser is in operation, handle the much larger volume of water demanded by the condenser against a lesser head. For hot well service, the pump has the advantages of requiring little space and attention and of being flexible and easily controlled, especially when steam turbine driven. It responds automatically to wide variations in load and greatly simplifies the operation of a condensing plant.

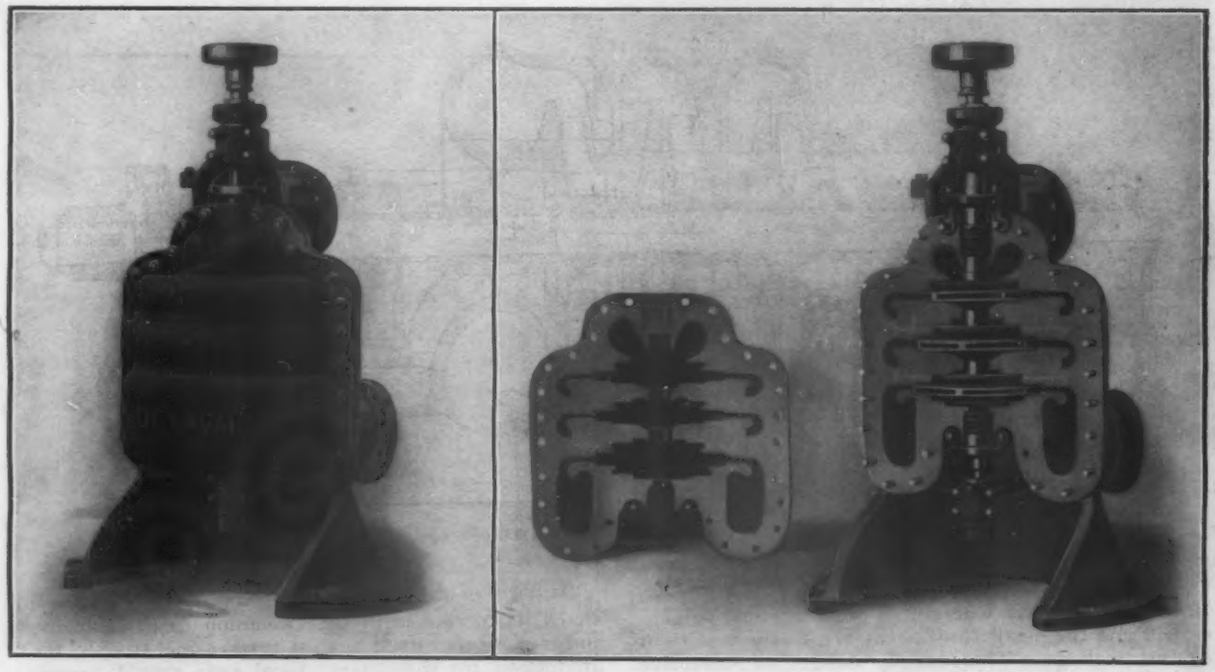


Fig. 13.—Assembled and Opened Views of a Vertical De Laval Three-Stage Pump.

Centrifugal boiler feed pumps* are usually of small capacity and deliver against a comparatively high head. They have pre-eminent advantages for this work, as they do not endanger the pipe line by vibration and shock, and the entrance of water to the boiler can be regulated without reference to the pump. There are no valves or large packings to be kept tight, nor is there danger of breakage of the pump through loss of suction by reason of hot water. The steam turbine driven boiler feed pump can be operated in connection with any standard pump governor to maintain either a fixed pressure or a fixed excess pressure in the feed line. In this case the turbine governor operates only as a maximum speed limit.

Where the highest steam economy is not required, as in the case of steam plant auxiliaries, the exhaust of which can be used in feed water heaters, the gearless turbine driven centrifugal pumps are recommended by their compactness and simplicity. In such units, the pump impeller and the steam turbine motor shafts are connected directly together by a flexible coupling. If

* *The Iron Age* contained an illustrated description of a set for this class of service.

* A set of this type was described in *The Iron Age*.

the exhaust of the turbine can be used for heating the feed water, the power required to drive the pump costs practically nothing, since all the energy in the steam is returned to the boiler. On the other hand, where economizers are installed and where there would otherwise be an excess of auxiliary exhaust, the feed pumps can be fitted with a low pressure turbine and run with the exhaust steam of other auxiliaries or from the intermediate receivers of the main engines or turbines. The turbine driving the pump can also be arranged to exhaust into the intermediate stage of the main turbine.

For circulating hot water in heating systems, the gearless turbine driven pump offers advantages in the way of simplicity, reliability and absence of shock. There is practically no expense, as the exhaust can be utilized in the water heater. The same considerations apply to brine pumps. By arranging these to be driven by mixed flow turbines, they may be operated on live steam or exhaust steam, or both, as required to round out the efficiency of the plant or to provide more exhaust for ice making.

De Laval pumps are widely used in steel works for hydraulic pressure service. There are no valves, an important matter where high pressure must be generated, and the small shaft areas are easily kept tight against leakage. There is no danger of excessive pressure, and the high pressures required can be generated with comparatively few stages. Usually plenty of exhaust steam is available in a steel plant to supply a low pressure turbine driving a pump, and such pumps show marked economy.

Pumps for irrigation, drainage or handling sewage are often driven by electric motors, using purchased current from transmission lines. Special materials are used where the water is corrosive or contains abrasive material.

The standard De Laval multi-stage pump has been approved by the Associated Factory Mutual Fire Insurance Companies for use as a centrifugal fire pump. The characteristics of these pumps prevent overloading of the driving motor under the various head and capacity conditions, as when a large number of hydrants are opened or many hose lines connected; and on the other hand the pressure will not rise excessively when the pump is delivering only a small output. Also, by reason of the sloping characteristic, there is no difficulty in starting a second pump in on a piping system on which one pump is already working. Fire pumps are supplied in four sizes: 500, 750, 1000 and 1500 gal. per min. Each will generate a standard pressure of 100 lb. per square inch, but the same type of machine can be furnished for special conditions requiring greater water capacity or greater head.

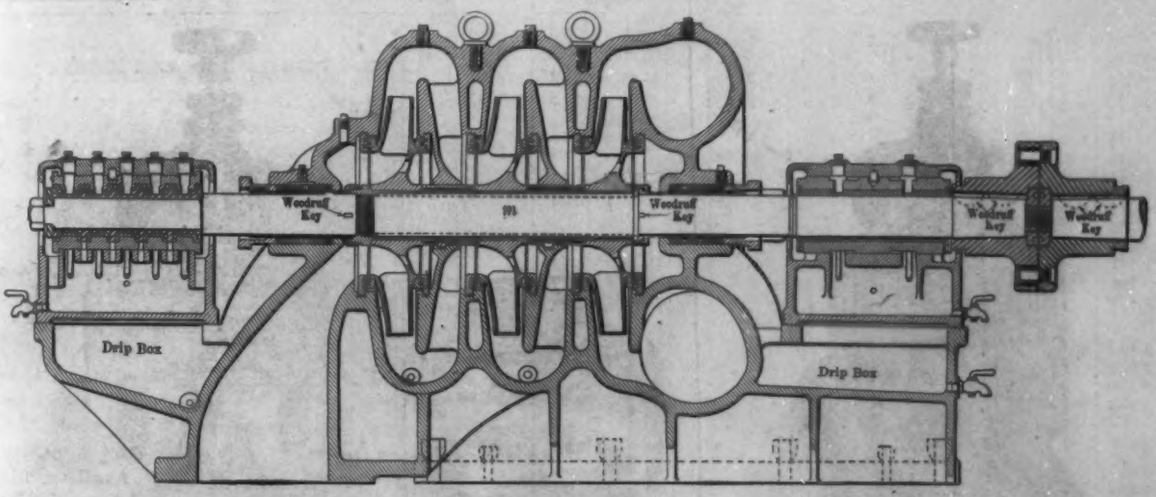


Fig. 14.—Longitudinal Sectional Elevation of a De Laval Three-Stage Centrifugal Pump.

The Dominion Iron & Steel Company's Report

The total net profits of the Dominion Iron & Steel Company for the fiscal year ended May 31, 1910, amounting to $2,237,489, showed an improvement of $11,655 over 1909, but were $362,511 less than in 1908. The lack of a greater gain over last year was due to the deficiency in the fuel supply from the Dominion Coal Company, which made it necessary to obtain coal from outside sources, and increased the cost of production to the extent of $160,000. The charge for depreciation also was greater by $89,809 than that of 1909. For the past four fiscal years the earnings have compared as follows:

	1910.	1909.	1908.	1907.
Totals	$2,237,489	$2,225,834	$2,600,000	$2,247,536
Interest	629,528	654,422	605,000	684,384
Surplus	*1,607,960	1,571,412	1,995,000	1,563,152

* Total surplus, May 31, 1910, was $2,058,225.

The production for 1910 of iron and steel of all kinds totaled 785,827 gross tons, as against 1,029,617 tons in 1909 and 1,029,155 in 1908, the loss being the result chiefly of the irregular coal supply.

In view of the fact that the company has now completed its merger with the Dominion Coal Company, and thus insured itself against further fuel trouble, the production for the current fiscal year should experience a considerable increase, and as orders are plentiful and the plants are running at capacity, earnings should show corresponding gains. The government bounties on pig iron will cease next December and those on wire rods in June, 1911, but it is thought that their absence will not be felt, owing to the fact that the cost of production is steadily being lowered.

Texas Iron Ore of High Quality

E. J. Lavino & Co., Bullitt Building, Philadelphia, Pa., furnish the following information in regard to the Texas iron ore which they recently received at that port on the steamship F. J. Luckenbach: "This ore was sampled while being discharged at Philadelphia by Andrew S. McCreath & Son, Harrisburg, Pa., and their test is as follows:

	Per cent.		Per cent.
Moisture	3.438	Manganese	0.314
Metallic iron	57.450	Sulphur	0.116
Silica	4.800	Phosphorus	0.118
Alumina	0.942		

"This sample cargo was made up of ore dug from the ground and shipped run of the mine; it had not been treated or washed in any way and shows how much better this particular Texas ore is than the ore found in other sections of Texas or in the other Southern States."

Some Recent Tests of Cast Iron *

The Sensitiveness of Cast Iron to Cooling Influences

BY ALEXANDER E. OUTERBRIDGE, JR.

In the *Proceedings* of the American Society for Testing Materials, 1903, Vol. III, p. 216, will be found a paper by the writer in which attention was called to the extraordinary variation in the physical properties, such as strength, hardness, softness, ductility, density, size of grain or "fracture," &c., of test bars or other castings of different thicknesses, poured from one ladle of molten iron, due to differences in the rate of cooling of the metal. No comparable variations, caused in this way, exist with other metals, such as the nonferrous alloys, or even with steel (except in a minor degree); and it is no exaggeration to say that the rate of cooling of gray cast iron exerts as important an influence in determining its physical properties as does variation of its chemical constituents, within, of course, certain wide limits.

In the paper referred to, four hypothetical cases were cited in illustration of this dictum and several actual tests were recorded. Some of these records were of experiments made by the writer over 20 years ago, while others were of more modern date. Some of them showed the difference in fracture, strength, density, &c., between sections cut from the center and those cut from near the surface of comparatively large masses of metal. Others showed remarkable differences in tensile strength between round bars of different diameters in the rough, cast from one ladle, and turned to different dimensions. The following conclusions were drawn from these tests:

Importance of Knowing the Dimensions of Test Bars

The rate of cooling of cast iron from the fluid to the solid state is such an important factor in determining the physical properties of the metal, that it is just as necessary to know the dimensions of the test bars as it is to know the chemical composition. For the same reason, it is equally desirable that standard sizes of test bars should be adopted which would be suitable for different grades of iron.

Since that time some progress has been made in this country toward the standardization of cast iron test bars, largely through the efforts of Dr. Moldenke and a committee of the American Society for Testing Materials, but there is still a lack of uniformity in the practice prevailing in this country and in Europe, which it is hoped may eventually be rectified.

Very recently the writer has had occasion to again observe the operation of the law of rate of cooling of cast iron in test bars varying but slightly in dimensions. In these later experiments the bars were accurately turned to uniform size and pulled on the 100,000-lb. hydraulic testing machine of William Sellers & Co., Inc. It happened that a number of experimental castings were required which would show very much higher tensile and transverse strength (the former to range from about 27,000 to 40,000 lb. per sq. in.) than if cast from ordinary foundry iron, and at the same time should be absolutely free from brittleness or hard spots in any part of the castings, which were only about ⅜ in. thick in the thinnest portions.

Test No.	Dimensions of Bars as Cast, ins.	Dimensions of Bars as Machined. Length, ins.	Diam., ins.	Area, sq. ins.	Ultimate Strength of Bars. Total, lbs.	Lbs. per sq. in.	Average, lbs. per sq. in.	Remarks.
2269	1×1×15	2	0.505	0.2	5,400	27,000	27,000	Poured from one ladle; cast March 29, 1910
2270	1×1×15	2	0.505	0.2	5,400	27,000		
2271	¾×¾×15	2	0.505	0.2	5,900	29,500	29,250	
2272	¾×¾×15	2	0.505	0.2	5,800	29,000		
2273	1×1×15	¾	0.505	0.2	7,000	35,000	36,050	" " " " " April 1, 1910
2274	1×1×15	¾	0.504	0.1995	7,400	37,100		
2275	¾×¾×15	¾	0.505	0.2	8,500	42,500	41,750	
2276	¾×¾×15	¾	0.505	0.2	8,200	41,000		
2299	1×1×15	¾	0.505	0.2	5,200	26,000	25,000	" " " " " April 5, 1910
2300	1×1×15	¾	0.505	0.2	4,800	24,000		
2301	¾×¾×15	¾	0.505	0.2	5,300	26,500	27,500	
2302	¾×¾×15	¾	0.505	0.2	5,700	28,500		
2284	1×1×15	¾	0.505	0.2	5,800	29,000	30,500	" " " " " April 9, 1910
2285	1×1×15	¾	0.505	0.2	6,400	32,000		
2286	¾×¾×15	¾	0.505	0.2	7,400	37,000	34,750	
2287	¾×¾×15	¾	0.505	0.2	6,500	32,500		
2288	1×1×15	¾	0.505	0.2	5,400	27,000	27,000	" " " " " April 12, 1910
2289	1×1×15	¾	0.505	0.2	5,400	27,000		
2290	¾×¾×15	¾	0.505	0.2	6,500	32,500	32,250	
2291	¾×¾×15	¾	0.505	0.2	6,400	32,000		
2303	1×1×15	¾	0.505	0.2	6,900	34,500	35,000	" " " " " April 21, 1910
2304	1×1×15	¾	0.505	0.2	7,100	35,500		
2305	¾×¾×15	¾	0.505	0.2	8,500	42,500	42,500	
2306	¾×¾×15	¾	0.505	0.2	8,500	42,500		

Tensile Tests of Cast Iron.

Results Shown by Recent Experiments

Two test bars, 1 x 1 x 15 in. and ¾ x ¾ x 15 in., were poured from the same ladle as each casting. The object of making two sizes of test bars varying only ¼ in., in lateral dimensions, was to approximate as closely as possible the cooling conditions existing in the castings, which varied in thickness. The larger bars were broken transversely in a testing machine, using a span of 12 in. Then one of the broken pieces from each transverse test and each of the smaller bars were turned to a diameter of 0.505 in. between threaded ends and pulled in the 100,000-lb. testing machine. The smaller bars were not subjected to the transverse test. Only tensile tests are recorded herein, and all represent tests of different bars, not duplicate tests of any single bar.

The ratio between the transverse strength of a bar 1 in. square, not machined, tested on a 12-in. span, and the tensile strength of the same bar machined, is about 1 to 10 with ordinary foundry iron, about 1 to 11 with stronger iron, and about 1 to 12 with very strong iron.

The following interesting points may be noted:

* Read before the American Society for Testing Materials, Atlantic City, N. J., June, 1910.

1. The uniformity of tensile strength of different bars of the same dimensions cast from one ladle of iron.

2. Invariably the smaller test bars (¾ in. square) of any series, if free from flaws, show higher tensile strength than the larger bars (1 in. square) cast from the same ladles, thus fully corroborating the observations previously recorded in 1903.

3. In machining the test bars, it was observed that the chips from the bars of the stronger metals (both from those 1 in. square and those ¾ in. square), instead of breaking off short, like ordinary cast iron, were quite curly like soft steel or wrought iron turnings.

4. In all cases save one, the metal of the castings in the thinnest section (⅜ in.) was entirely free from chill, or mottled iron, and was readily machinable. In the exceptional instance the metal was perfectly gray in the test bars and in the castings themselves, except in the thinnest portions where it was almost white, due to the more rapid cooling of these very thin walls.

A study of the accompanying table of tests will show that the minimum increase in the average tensile strength of the two test bars ¾ in. square, over the average tensile strength of the two bars 1 in. square, cast from the same ladle and turned to the same diameter, is 2250 lb. per sq. in. The maximum increase under like conditions is 7500 lbs. per sq. in.

It is certainly remarkable that differences so large should occur between bars differing so little in dimensions, cast from one ladle and presumably of uniform mixture of iron. It shows how very sensitive the metal is to cooling influences, and again reveals the importance of adopting standard sizes of bars for tests of cast iron.

An Automobile Steel Body Factory

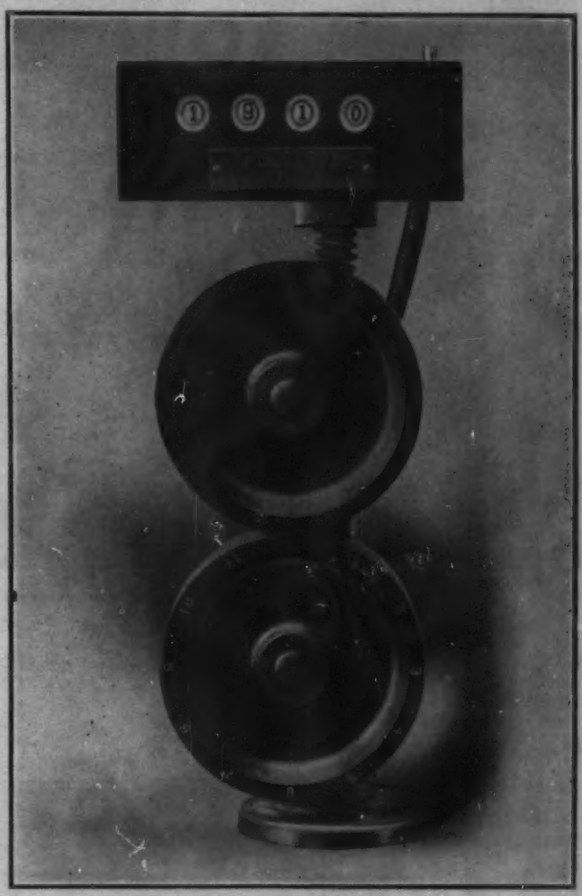
The Bauer Steel Body Company, incorporated under the laws of Michigan, will be located in its new factory, Warren and Fifteenth streets, Detroit, Mich., after July 15. The company will manufacture steel bodies, automobile hoods, fenders, tanks and other special sheet metal products. The company's automobile body is of its own design, and is fully protected by patents. These bodies are constructed on a frame work of angle iron and special steel. The inside is lined with a fibrous material, which serves as a nonconductor of heat or cold. This material is treated in a manner which hardens it, makes it an integral part of the steel and further serves to keep it from rattling.

The company has located in Detroit because of the numerous automobile factories located there or in that vicinity, but expects in time to establish factories at various other points. At present most of the machinery has been purchased for the new plant, but from time to time special machinery and equipment will be required, such as is used in sheet metal works. The president of the company is Charles W. Rosenberg; vice-president and superintendent, M. C. Bauer; secretary and treasurer, Milton C. Hirschfield; superintendent of sheet metal department, John T. Lawson; superintendent of painting department, Joseph Schumacher.

Beall Brothers, Alton, Ill., have completed the rebuilding of their shovel factory which was destroyed by fire some five or six months ago. They have added to this new factory all modern improvements. All the machines are run by individual motors of the best pattern. They also generate their own electricity. All the wires are underneath the ground. The factory is about three times as large as the old one and is capable of turning out 350 to 450 dozen shovels, spades and scoops per day. It is absolutely fireproof, there being not a piece of wood as large as a toothpick in the forging department. They are now prepared to fill orders promptly.

The Roco Wire Measuring Device

The C. J. Root Company, Bristol, Conn., has recently placed on the market the Roco wire measuring device for measuring bare or insulated wire, rope, &c. The material passes over the wheel of the device and is measured in units of 1 ft. or any other units, according to the circumference of the measuring wheel used. In the illustration the machine is shown with a 12-in. measuring wheel. The circumference of this wheel is either smooth or corrugated, and the friction roll running in conjunction with the measuring wheel can be grooved for various sizes of wire or the edge may be perfectly smooth. The friction between the two members is regulated by a spring. The counting mechanism,



The Roco Counter for Measuring Wire Made by the C. J. Root Company, Bristol, Conn.

which is contained in the small rectangular box at the top of the machine, is operated by a flexible shaft connected with the measuring wheel, and the numbers showing through the holes indicate the number of units equal to the circumference of the measuring wheel that have been measured. This mechanism can be set to zero at any time by opening the case and turning the dials back, or it can be supplied with a closed case to prevent tampering with it. When so furnished the record is a continuous one and the difference in the readings at the start and finish gives the length of the material measured.

This device can be attached to the floor, bench or side walls permanently or can be moved from one part of a factory or store to another, wherever measuring has to be done. In a hardware store it can be used for measuring wire, rope, wire netting, light chain and flat or round leather belting. Another application is its use in the field by electric light, telegraph and telephone companies for measuring the amount of wire employed in the construction of new lines or service connections, where it is essential that an accurate record of the amount of material used be obtained to charge the consumer accordingly.

Dodge Drive in a Combined Steam and Water Power Plant

An Interesting Installation at One of the Kimberly-Clark Company's Paper Mills

Appleton, Wis., has long been important in the paper making industry. The Fox River provides abundant water power and formerly there were a number of small or moderate sized plants which in recent years have been consolidated or transformed into a fewer number of larger units. Two very small and old paper mills were acquired some time ago by the Kimberly-Clark Company, but have been abandoned recently as too small for economical operation. These mills stood close together, so that their power facilities could readily be combined. On the site of one of the mills, formerly known as the Vulcan mill, a steam and water power electric generating plant has been erected from which current is transmitted to the company's mills at Kimberly, four miles away. The new plant is known as the Vulcan power house.

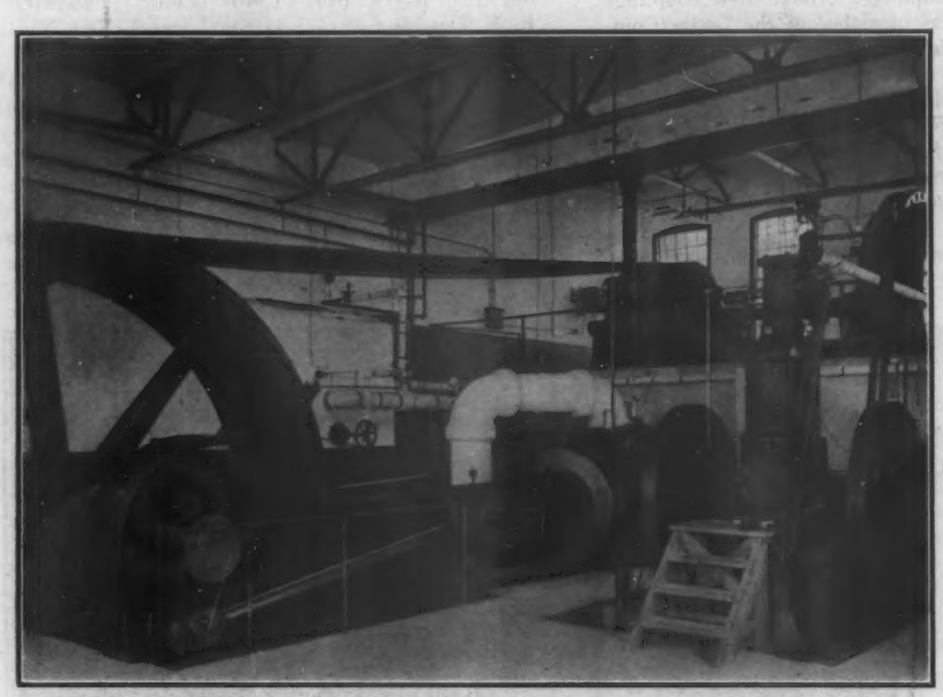


Fig. 1.—The Dodge Rope Drive in the Combined Steam and Water Power Plant of the Kimberly-Clark Company's Kimberly, Wis., Paper Mills.

Still standing in its old position is a 24 x 48 x 42 in. cross compound Corliss engine shown in Fig. 1. Above and on the level of what was formerly the wet machine floor of the old Vulcan mill is a 750-kw. alternating-current generator. The shaft of the latter has couplings at both ends, one side connected to a water wheel line shaft and the other to a shaft carrying a driven sheave for a Dodge rope drive from the flywheel of the old steam engine. The driven sheave is shown in the foreground of Fig. 2. The flange coupling on each side of the generator has a separator plate between its faces, so that the entire load may be carried by the water wheel alone or by the steam engine alone, and the idle prime mover can be completely isolated by removing the bolts and plate from the corresponding coupling. When the water is insufficient to carry the load the engine may be used to assist, and if the water fails entirely the engine may carry the entire load and the water wheels be cut out of operation.

Originally the engine delivered its power by a rope drive so that the flywheel was already grooved, but it so happened that a larger diameter and wider face wheel was desired, and a Dodge hardwood lagging was applied to the flywheel to form a new grooved surface. The wood lagging increased the pitch diameter by 18 in.; the iron wheel had a pitch diameter of 16 ft. with grooves for 23 wraps of 1¼-in. rope. The wood lagging gives a pitch diameter of 17½ ft. and is grooved for 29 wraps of 1¼-in. rope.

Figs. 1 and 2 show the two ends of the rope drive. A single tension carriage which travels a horizontal track under the floor below the driven sheave keeps the rope at proper tension. The lagging on the flywheel is made in two split sections, that is, in four semi-circular pieces, and is applied to the wheel so that the

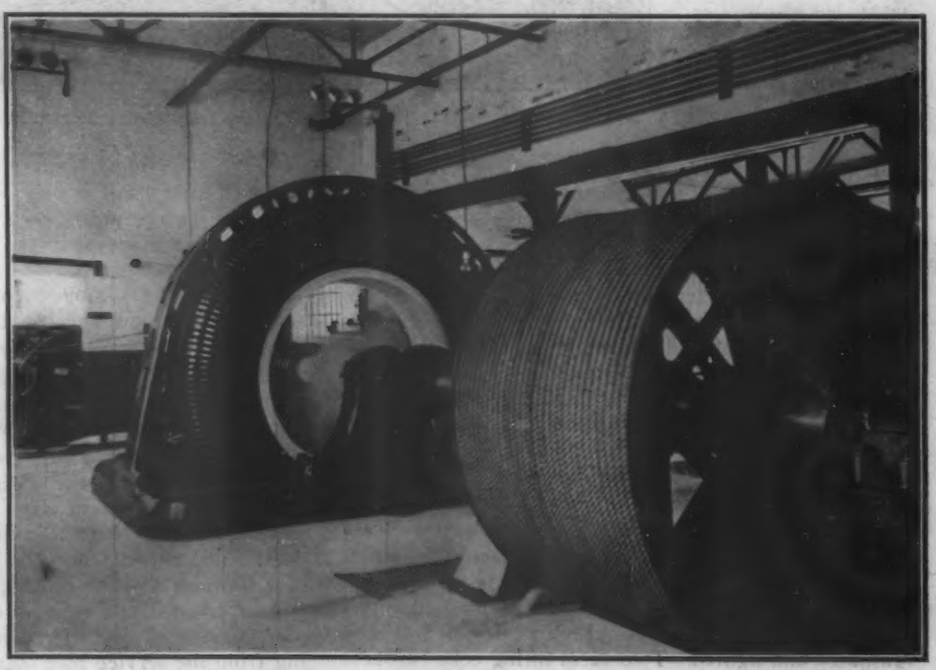


Fig. 2.—The Driven Sheave and the Alternating Current Generator.

parting lines break joints in the lagging itself and with the parting lines of the iron pulley. The wood lagging thus becomes an important reinforcement of the strength of the entire wheel.

The water wheels were furnished by James Leffel & Co., Springfield, Ohio, and the transmission equipment by the Dodge Mfg. Company, Mishawaka, Ind. There are four Sampson turbine water wheels all running right hand. The turbine shafts are in two sections below and above the couplings. Above these couplings the entire equipment was furnished by the Dodge Company. The vertical shafts are carried in special bearings attached to heavy cast iron bridge trees supported by longitudinal steel side beams. The large bevel gears at the top of the vertical shaft mesh with four bevel pinions on the line shaft whose extension is coupled to the generator. The water wheels run at 96 rev. per min. and the line shaft at 214 rev. per min., which is the generator speed.

Fig. 3 shows the arrangement and construction of the transmission, with its heavy cast iron yokes and bridge trees for supporting not only the vertical shafts and bevel gears, but also the horizontal line shaft and bevel pinions. Openings in the top of the main yoke castings are filled with distance pieces, whose removal permit lifting out any section of the horizontal shaft without disturbing any equipment whose removal is not desired. Distance pieces are inserted between the faces of all couplings on the line shaft, not only to facilitate removing the shaft sections, but also to permit cutting out the fourth wheel when only three are needed, or the fourth and third wheels when only two are required. As will be seen in this illustration, the main yokes not only carry a pillow block bearing for the horizontal shaft, but also are extended downward into the large bevel gears to carry a bearing for the top end of the vertical shaft. A bridge tree below the main yoke carries a second vertical bearing immediately beneath the bevel gear. Thus the shafts are afforded ample and sure support, so essential for proper operation of gearing in such important service.

Fig. 3.—The Dodge Equipment in the Transmission from the Leffel Water Wheels.

The installation of this equipment was effected in remarkably short time. The water wheel transmission equipment was erected in four working days.

The Crown Cork & Seal Company's New Brass Foundry.—The Crown Cork & Seal Company, Baltimore, Md., will begin operations in its new brass and aluminum foundry this week. The foundry building is 40 x 70 ft., has an extremely high ceiling and is well ventilated and lighted. Two Ideal tilting coke furnaces of 600 lb. capacity have been installed, also three crucible fires of the usual type, Millet core ovens and sand blast apparatus for cleaning castings. Convenient arrangements have been made for sand, coke and metal storage. The new foundry will accommodate 14 molders, the class of work being almost entirely bench work. Most improved sanitary arrangements for the use of employees have been provided. Electricity will be exclusively used for power purposes. At a later date the company will install a case hardening department in one portion of the foundry building.

New Publications

Downing's United States Customs Tariff. Size, 4½ x 6¾ in.; pages, 630. Cloth bound. Publishers, R. F. Downing & Co., 24 State street, New York. Price, $2.

This work gives the full text of the tariff act of August 5, 1909, with a supplementary aphabetical schedule of duties, so that rates of duty can be readily found on any article imported. The work contains over 20,000 such items, each of which shows the paragraph in the law pertaining to it, and further refers to all decisions that may govern. The book has been revised to March 1, 1910. In addition to the alphabetical schedule, it furnishes much valuable information in relation to customs matters. The firm has published United States tariff books for about 30 years, and has grown to be recognized as a standard authority. The statement is made that the United States Treasury Department has purchased 1000 copies of this edition for use in the various departments of the customs service throughout the country.

Wiring a House. By Herbert Pratt. Bound in paper. Size, 5⅝ x 8 in.; pages, 21; illustrations, 6. Price, 25 cents. Published by the Norman W. Henley Publishing Company, New York City.

This is the sixth of a series of practical papers, and shows every step in the wiring of a modern house or shop. All the different steps are thoroughly explained, so that the task is made comparatively easy. Having determined the number and location of the lights to give the best lighting effects, the placing of the meter is next taken up. The main cut-out cabinet location is then considered, and the running of the necessary wiring from the service pole outside to the different lamps shown on the floor plans follows. The process of determining the sizes of wire to be used is next explained. The work of installation is taken up and instructions are given for putting in the system in molding or open or concealed knob work. A table of safe carrying capacity of wire, as determined by the National Board of Fire Underwriters, is appended.

The Electro-Magnetic Percussion Drill

For cutting holes in concrete pneumatic drills are commonly used, but it is appreciated by contractors that an electric drill would have many advantages. Electricity is available almost everywhere now and an electric drill could be easily carried to the work and put into operation in a few minutes, while a pneumatic tool must be accompanied by an air compressor. Further, an electric tool could be more easily moved about on the work with a flexible cable supplying the power rather than the heavier and stiffer air hose. The low first cost of an electric drill compared with a pneumatic outfit also should be an important consideration. The illustrations show an electric type that promises commercial success—the Model five-percussion drill manufactured by the Electro-Magnetic Tool Company, Chicago, Ill. Although this tool is heavier than the ordinary pneumatic drill, it weighs only 34 lb., and its excess of weight is objectionable only in overhead work, and then a supporting standard may be used. When the tool is used horizontally or for drilling downward, the extra weight is no drawback. As shown in Fig. 1, the tool is quite easily handled.

Fig. 1.—Drilling Horizontally.

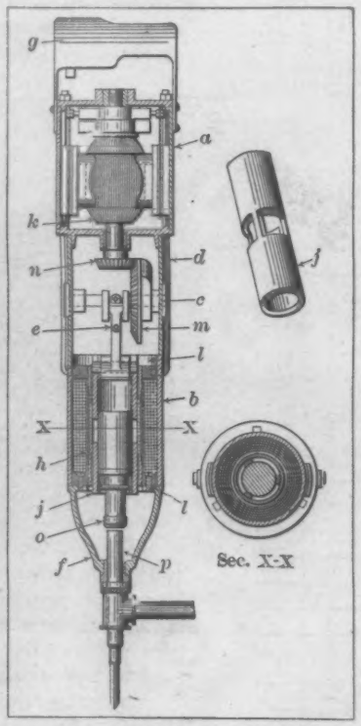


Fig. 2.—Section of the Drill.

The Percussion Drill Made by the Electro-Magnetic Tool Company, Chicago, Ill.

Referring to Fig. 2, which is a section illustrating the parts of the electric drill, the frame consists of two pieces of steel tubing, *a* and *b*, separated by a brass gear case *c*, and fastened together by the two tie rods *d*. The nose piece *f* and the handle *g* are cast aluminum. In the lower section of the drill frame *b* is a solenoid *h*, designed to exert a pull of 100 lb. A steel sleeve *j* within the solenoid is operated by a small series motor *k* installed in the upper portion of the drill frame, through the gears *m* and *n* and the connecting rod *e*. The hammer element *o*, weighing 2½ lb., is located inside the sleeve and is not connected either mechanically or electrically with any other portion of the drill. The tool is totally inclosed to protect the working parts from dust or dirt and all interior nuts and bolts are securely fastened. The gears and rubbing surfaces are case hardened steel and the bronze bearings are of ample size and are provided with adequate means for lubrication. All electrical connections are thoroughly bushed and insulated.

Current passing through the solenoid sets up a powerful magnetic field, the effective direction of which on the hammer is determined by the position of the sleeve. The latter, being reciprocated rapidly by the motor, produces a shifting of the magnetic field and causes the pull to be exerted first at one end and then at the other of the hammer element. This part endeavors, therefore, to follow the movement of the sleeve. On the forward movement it impinges on the drill shank delivering a hammer blow and on the return is automatically brought to rest by the action of the magnetic field. As the hammer element is not mechanically connected with any other part of the drill, no sudden strains are put upon the gears or crankshaft by the blow. The magnetic connection acts with a perfect cushioning effect which is one of the marked points of superiority in this tool, and vibration is declared to be much reduced. The motor which imparts the reciprocating motion to the sleeve is of the series type and as the load is constant it cannot run away. As the motor and solenoid are connected in parallel, the breaking of the external circuit, in stopping the drill, leaves the solenoid circuit closed through the motor, thus preventing any inductive kick from the coil. The drill is started or stopped by a switch in the handle readily controlled by the hand which supports the tool. The operator's other hand grasps the drill holder, and moving this back and forth imparts a rotary motion to the drill itself.

The amount of power required is the same as that consumed by seven 16-cp. lamps, and the tool may be directly connected to a direct current lighting outlet. The drill delivers 1450 blows per minute, and the speed is said to be equal to or greater than that of an air hammer used on similar classes of work. It is recommended for drilling holes from ¼ to 1¼ in. in diameter, and may be used in any position with equally good results. The tool drills ⅞-in. holes 4 in. deep in concrete in from 45 to 75 sec., and 9-16-in. holes 2 in. deep at the average rate of 1000 per day.

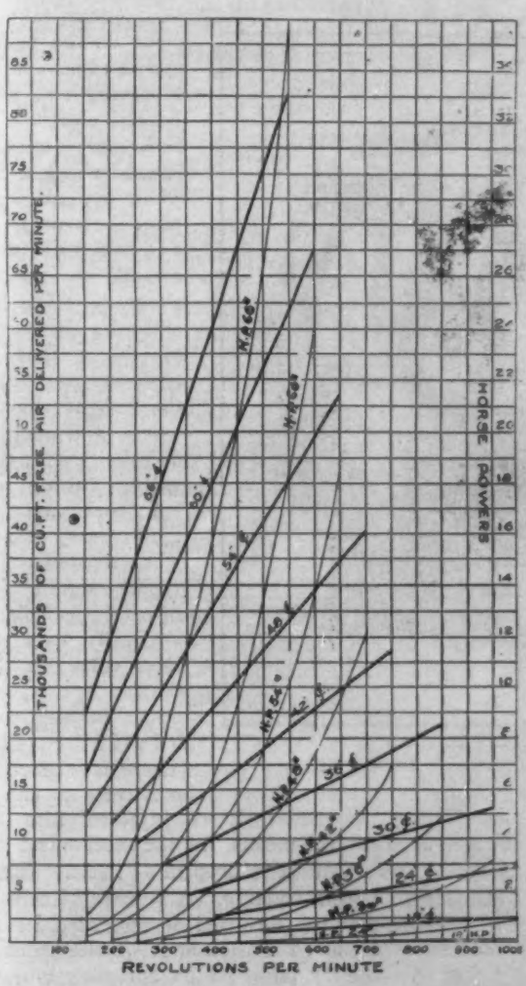
The development of the business of the West Penn Steel Company at Brackenridge, Pa., manufacturer of open hearth steel sheets for all purposes, and also open hearth steel sheet bars, has been quite rapid, and the company is able to keep its mills in full operation in the manufacture of sheet bars and steel sheets. Its two 80-ton open hearth steel furnaces were built by the S. R. Smythe Company, House Building, Pittsburgh. Its sheet mills are rolling from No. 10 to 30 gauge. The company contemplates making additions to its finishing capacity in the shape of pickling machines, annealing furnaces and cold rolls, which will permit the entire output of the mills to be put into sheets of fine finish and for special purposes.

The Bridgeport Forge Company's Improvements.—The McClintic-Marshall Construction Company, Pittsburgh, has received an order for the steel work for a shop 57 x 160 ft., two stories, for the Bridgeport Forge Company, Bridgeport, Conn. Another building of the same dimensions, brick and steel construction, will also be erected. The construction company has about 75 days in which to erect these two buildings and expects to complete the work in that time. They will cost nearly $100,000, and will be equipped with traveling cranes and labor saving devices electrically driven. Charles F. Bliss is president of the Bridgeport Forge Company and Thomas Dunlap, for a number of years sales manager, has been made general manager.

Power and Capacity of Davidson Ventilating Fans

Machines for producing air movement naturally divide themselves into several groups, each proving most efficient within certain limits of air pressure produced. When velocities and resistances are low the screw or propeller type best serves the purpose. Here the air is both received and discharged in an axial direction. For pressures ranging from somewhat less than 1 ounce per square inch up to a possible 12 to 16 ounces, the peripheral type occupies the field. In this the air is received axially, but delivered radially around the periphery usually into a spirally expanding case with a suitable outlet.

Beginning within the range of 10 to 12 ounces, the rotary blower, moving forward, uniformly measured



Power and Capacity Curves for a Davidson Ventilating Fan Made by the Massachusetts Fan Company, Watertown, Mass.

volumes of air, possesses the ability to create pressures ranging up to several pounds per square inch. The turbine blower, now in process of development, covers much the same field. For the production of still higher pressures the piston blowing engine and the air compressor successfully meet the requirements.

The determination of volumetric capacity and the corresponding power expenditure presents more or less difficulty in the case of air movement. This becomes increasingly so as the velocity and pressure are reduced, principally because ordinary resistances and atmospheric disturbances have a proportionally greater influence as the produced velocity and pressure are reduced. For this reason the range of capacity and power in the case of screw or propeller fans is subject to wide fluctuations according to the resistance presented by extended piping systems or wind velocity. The maximum delivery and the minimum power per cubic foot for a given number of revolutions is secured only when the fan delivers freely in still air and there is no opportunity for interference of air currents. It is under these conditions that the properties of Davidson ventilating fans as presented in the accompanying curves have been determined by the Massachusetts Fan Company, Watertown, Mass.

The effect of increased resistance through the extension of piping or the counter blowing of the wind is to throttle the discharge, thereby decreasing it, but at the same time increasing the power required to drive the fan. This is exactly opposite to the effect of resistance in the case of the peripheral discharge; here increase in resistance, which is equivalent to reduction in free delivery area, decreases the work to be done and hence the power required. But even when the outlet is entirely closed considerable power—roughly, one-third of that with a full outlet—will be required to drive the fan within the case. With the propeller fan, on the other hand, the decrease of resistance to free discharge increases the power required until the maximum must be expended when no air whatsoever is discharged. In other words, in a peripheral fan, the power is automatically adjusted, although only approximately, to the work actually accomplished in moving air, while the propeller fan becomes increasingly inefficient as the delivered volume diminishes. Hence it is far more vital in the case of the latter type that resistances should be reduced to a minimum.

New Steel Tie Factory at Newark, Ohio

The Steel Tie & Mfg. Company, Newark, Ohio, incorporated under the laws of that State, has been organized with the following officers: President and general manager, T. J. Costello, formerly general manager of the Buckeye Rolling Mill; vice-president, J. W. Blower of Columbus, general manager of the Hislyvania Coal Company; secretary and treasurer, L. B. Richards of Newark, Ohio, president of the Standard Rail Company. The company started last week to operate its new plant, equipped up to date by the Osborn & Sexton Company, Columbus, Ohio, and will turn out 500 ties per day, which will be increased as soon as new equipment can be put in operation.

The steel ties are manufactured under Blower's patent. They have been thoroughly tried out in several of the largest coal mines in the State, and have proved to be more satisfactory than was expected by the patentee. For the time being, the factory will be kept busy exclusively on ties for mines and industrial plants, as enough orders have been received to keep running on the light ties for several months.

The St. Louis Steel Foundry Increases Its Capacity.—As a result of the success that has been met with in the manufacture of manganese steel crossings, frogs, switches, &c., for steam and electric railroads, also miscellaneous manganese steel, the St. Louis Steel Foundry, owned and operated by the Curtis & Co. Mfg. Company of St. Louis, Mo., has been compelled to make extensive enlargements of its plant, which have just been completed. Additional crane and grinding equipment have been installed. The enlargements have added about 100 per cent. to the floor space and places the company in much better position to take care of and make early deliveries on excess tonnage.

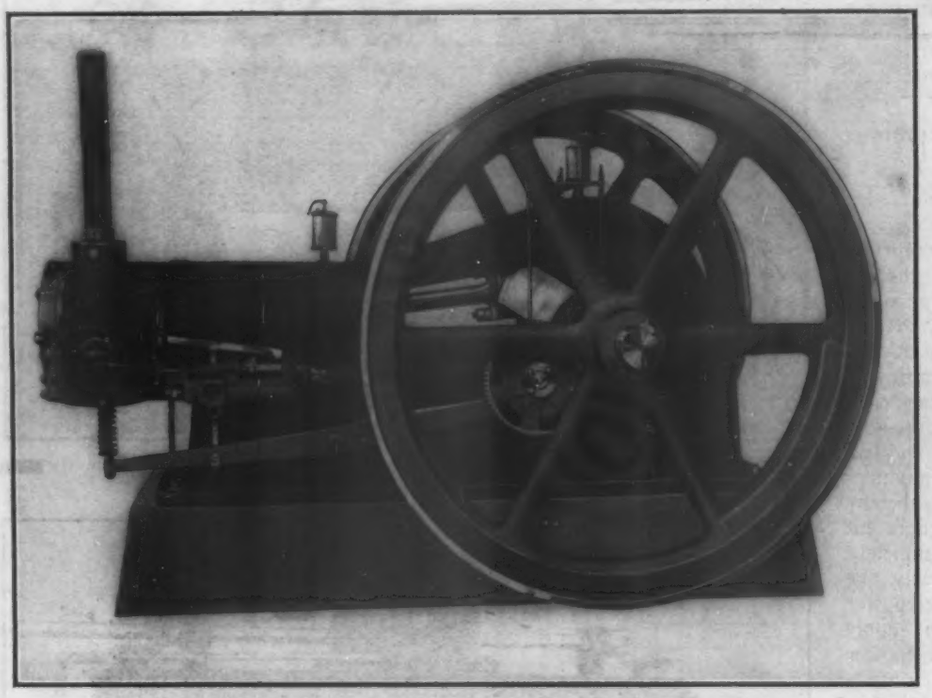
The Newport Sand Bank Company, miner and shipper of molding sand, Newport, Ky., held its annual meeting June 27. Cleveland H. Dye was elected a director to fill the vacancy caused by the death of J. Frank Dye. The directors elected George W. Dye president and treasurer and Cleveland H. Dye secretary.

S. D. Childs & Sons,
Mechanical and Civil Engineers,
PITTSBURGH, PA.

Large Charter Gasoline Engines

Sizes of 60 to 100 Hp. Now Being Built

The company claiming to be the first to build and market commercially internal combustion engines using a liquid fuel instead of gas, the Charter Gas Engine Company, Sterling, Ill., has recently added to its line larger power gasoline engines, developing from 60 to 100 hp. This was in response to a demand for heavier and more powerful engines of the horizontal single-cylinder type, capable of running economically, continuously and smoothly, and still not require a more skilled engineer to operate them than is usually found caring for smaller engines. While the main working parts do not differ except in size from those of a 20-hp. or 30-hp. engine, there have been added a number of refinements of the larger producer gas engines



An 80-Hp. Gasoline Engine Built by the Charter Gas Engine Company, Sterling, Ill.

that contribute to convenient and economical operation. The illustration shows an 80-hp. engine, and following is a brief description of the features of this type:

The bed is made extra heavy and is strengthened by ribs at points of greatest stress. It has a wide oil trough extending around the base, which adds stiffness as well as gathering waste oil, carrying it to a convenient drain pipe. At the crank end the housing carrying the main bearings is stiffened by bringing the end of the bed and the apron up to a line even with the center of the crankshaft; by this means springing of the main bearings is prevented, with a minimum weight. The main bearings are half-cylindrical machined shells, divided at 45 degrees with the line of explosion pressure. Oil grooves on the outer ends prevent oil working out on to the fly wheels. The lower half bearing can be removed by jacking up the end of the crankshaft slightly and revolving the shell out of its place. The connecting rod brasses are easily taken up in the event of wear; the crank end by means of liners, and the piston end by a wedge and bolt adjustment. A substantial crank shield carrying a sight oil reservoir of ample capacity covers the crankshaft, connecting rod and open end of the cylinder. Oil tubes with sight-feed adjustment lead to the main bearings, crank pin and gear pin bearings. To allow the use of two grades of lubricating oil, a separate sight feed cylinder oiler is usually provided.

The inlet and exhaust valves, of the vertical poppet type, are both mechanically operated. The positive operation of the inlet or suction valve is important in securing the maximum power, economy and smoothness of operation, being much superior to automatically opened valves. The exhaust valve is operated by a cam on the gear shaft, which carries also an eccentric for operating the inlet valve, igniter, fuel and water pumps. Vertical valves are used in both the circulating water and fuel pumps; these can be inspected, cleaned or renewed by removing a cover on the side of the respective valve chambers. The circulating water is forced by the pump into the exhaust case, where the coolest water is needed for properly cooling the exhaust valve and stem. From the exhaust case the water goes through the cylinder water jacket and out.

The igniter is of the make-and-break type, has adjustment to take up wear on the points, and is removable by loosening two nuts. Either electrode is removable with a small wrench, as there are no taper pins, but simply a clamp adjustment on the movable electrode. The hit-and-miss governor of the centrifugal type is carried on the hub of the flywheel, and operates on the exhaust valve, cutting out the fuel and air charges except when needed.

The liquid fuel injector is placed vertically over the inlet valve, so that the fuel spray drops down to the combustion chamber. There is, therefore, positively a charge of fuel taken whenever it is injected into the inlet valve by whatever means, for the mechanical lifting of this valve allows it to drop in of itself. This is of considerable help in starting. A feature of this device is that the liquid is throttled or regulated, not by a needle valve a short distance back of the point of spray, but at the very point of its spraying into the downward rushing column of air. A water injector for introducing with the fuel a fine jet of water, which has the effect of moderating the explosion of the gas so that more of the expansive effect is realized, is another important feature, allowing of higher compression with its attendant economy and surety of operation.

Special attention has been paid to making these engines easy starters. An easily manipulated lever for throwing into action a compression relief cam, and another for retarding the spark, greatly relieve the drudgery of starting. While all Charter engines are regularly equipped with a self-starting pump and match striker, with which one man can easily start the largest engine, it is possible for one man alone, taking advantage of the compression relief and late spark, to start by pulling on the wheels. All the working mechanism is on one side in easy reach of the operator. There are no rods or pipes inside the bed of the engine. The engine is guaranteed to develop its rated

power with a fuel consumption of 0.1 gal. per horsepower-hour.

Charter engines have been in use for 20 odd years for nearly all kinds of power purposes, ranging from cow milkers and other light demands to electric light plants, large pumping plants for cities and irrigation, &c. The type herewith illustrated has been put on rice plantations where no skilled labor is available and where the demand for constant supply of water is imperative, and it is claimed its simplicity and reliability have fully met the needs and its economy has been remarkable. In exacting work, with low grade and low cost fuel oil, it is declared to be equally successful. When equipped with a throttling governor it is capable of extremely steady operation for work requiring closely uniform speeds.

Penberthy Injector Output

As something of an index of steam power development in the last quarter century it is interesting to know that on March 29, 1910, the Penberthy Injector Company, Detroit, Mich., made its 600,000th injector. The manufacture of these injectors was begun in 1887. If all of these injectors were still in operation and had an average capacity equivalent to the GG 2½-in. Penberthy injector they would represent a combined capacity sufficient to feed boilers of nearly five times the boiler horsepower capacity necessary to supply the estimated total horsepower in steam engines now in use—150,000,000 hp. Put another way, these injectors would deliver into boilers against 90 to 100 lb. pressure over one-third the amount of water that is constantly going over Niagara Falls, which is approximately 125,000,000 to 150,000,000 gal. per min. With a capacity of 4200 gal. per hour each these injectors would have a combined capacity of 2,520,000,000 gal. per hour, or 21,022,459,848 lb. per hour, or 336,898,395 cu. ft. per hour, or 5,614,973.3 cu. ft. per minute. Allowing 30 lb. of water to a boiler per horsepower hour, the 600,000 injectors would have capacity sufficient to supply 700,748,661 boiler horsepower.

The Society of Automobile Engineers will hold its summer meeting in Detroit July 28 to 30. As a result of the very active campaign that is being made this society is occupying its rightful position in the automobile industry. The July meeting will be the largest and most interesting in its history owing to the feeling throughout the membership that under the energetic administration much of the work which should be undertaken by the society will be carried to a successful conclusion. A programme has been arranged which provides for the reading of papers, discussions and visits to manufacturing plants.

The Improved Cincinnati Planer Elevating Device

The Cincinnati Planer Company, Cincinnati, Ohio, has brought out an improved power elevating device for planer cross rails. Fig. 1 is a front view, showing the arrangement of gears; the direct drive is used for lowering the rail and the compound gears, giving a reverse motion for raising the rail at about half the lowering speed. The stand is bored out and fitted with bushings so that the top shaft which carries the pulley can be withdrawn with the bushings intact and inserted from the other side. Thus when making various styles of drives, which are sometimes complicated by odd dimensions of motors, the pulley can be used on either side. As the power elevating device is used relatively little it has been designed so that only the pulley and top shaft run when it is not in use. This device is powerful and sensitive, and is operated by two small clutches on the top shaft. The two oilers in the top shaft and one at the end provide the lubrication. By having a bearing on each side of the main driving gears all danger of springing the shaft is eliminated. The rear view, Fig. 2, shows the simplicity of the operating device. On the extreme right is the handle for manipulating the clutches, and the small handle for locking it in a central position preventing accidental engagement.

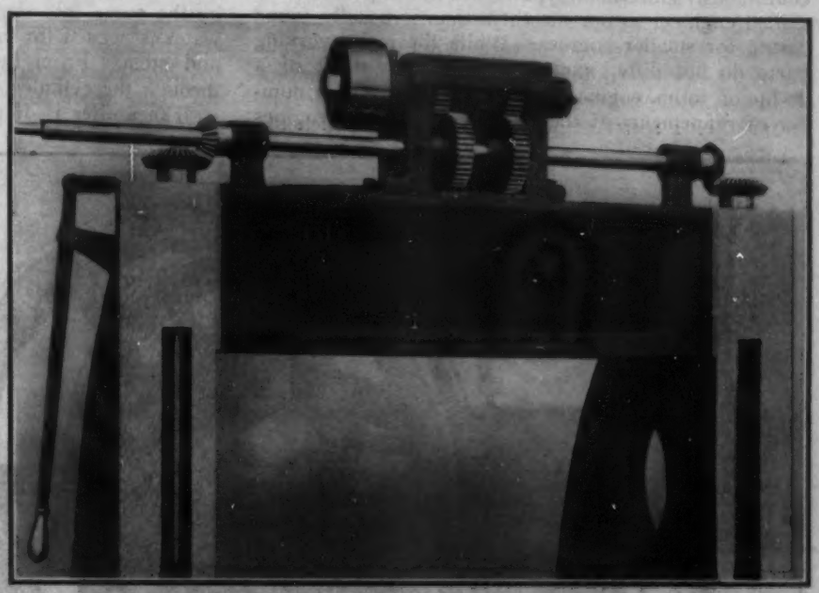


Fig. 1.—The Improved Power Elevating Device for Planer Cross Rails Made by the Cincinnati Planer Company, Cincinnati, Ohio.

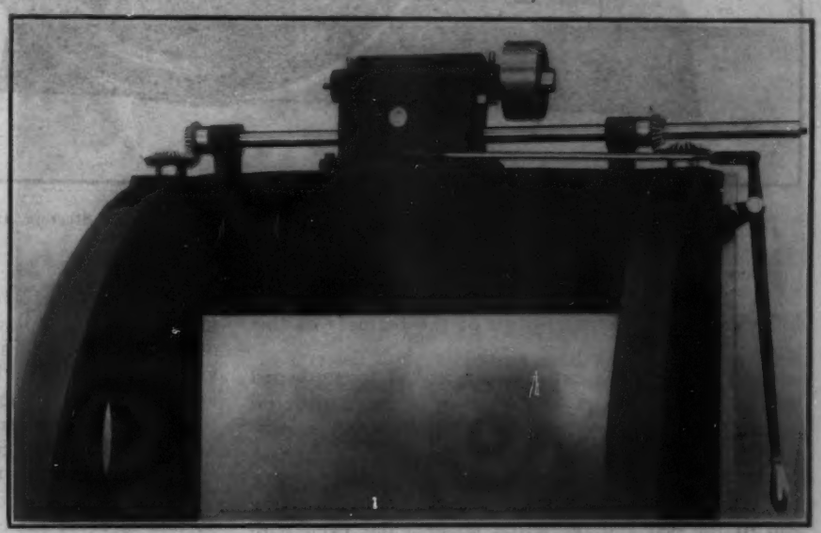


Fig. 2.—A Rear View of the New Cincinnati Planer Elevating Device.

The Akerlund Bituminous Gas Producer

A Suction, Down Draft, Grateless Generator and Novel Cleaning Apparatus

The Akerlund bituminous gas producer, built by the Gibbs Gas Engine Company, Atlanta, Ga., is of the suction, downdraft type. The system comprises a generator, in which air saturated with water vapor it drawn downward through the incandescent fuel, thereby effecting the necessary combination of gases; a cooler in which gaseous tar, lampblack and other impurities are precipitated and washed out; a coke scrubber of the usual form in which the process of cleansing is carried still further; a purifier, containing sawdust arranged on a series of perforated trays, in which the gas is further cooled and freed from all moisture and impurities which may have passed through the rest of the system. Suction is maintained by a slow speed positive exhauster of the Garden City type. The exhauster is connected through a small pressure equalizing tank and automatic pressure regulating valve to a by-pass, which relieves the fire from unnecessary draft when the load varies. There is provision, also, for using the exhauster to blow the fire when starting from dormant conditions and for reversing the draft to deliver gas to the engine by manipulating valves and without changing the direction of rotation or drive of the exhauster.

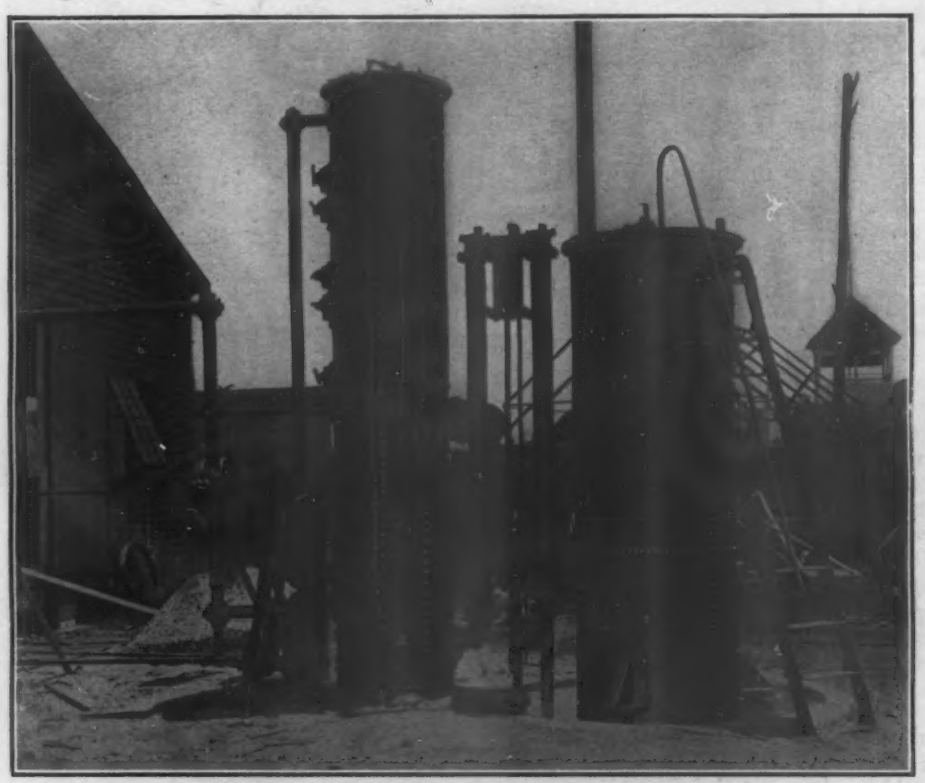


Fig. 1.—The No. 2 Type B Akerlund Gas Producer Built by the Gibbs Gas Engine Company, Atlanta, Ga.

The Generator

The generator is a steel shell, including an annular vaporizer somewhat below the fire line. The shell is supported on piers in a water pit. In the center of the pit, extending upward inside the space inclosed by the shell and to a point somewhat below the vaporizer, is a conical ash pier to prevent irregular accumulation of clinkers. The outer wall of the vaporizer and the inside wall of shell in connection with a baffle plate form a gas accumulation chamber, which insures uniform distribution of draft over the entire fuel bed by taking gas from the center in an annular current which circulates in a horizontal plane outward from the center to both inlets of the accumulation chamber. Air is introduced above the surface of water in the vaporizer downward through induction pipes. The moist vapor then goes upward through similar pipes and is released immediately above the fuel bed in the combustion chamber. These pipes are surrounded by the brick lining, thereby getting all possible benefit of preheating and superheating.

The vaporizer acts as a support for a simple cylindrical lining of standard firebrick. The fire is supported on the ashes which build up from the bottom of the pit, there being in the generator no grates or slopes or projections which could form a lodging place for clinkers and thereby cause irregularities in the fire which would lead to a variation in the quality of the gas as well as in the quantity of gas delivered. The walls of the vaporizer are exposed only to ashes and hot gas, the fire being well above.

The top of the generator is provided with charging doors arranged conveniently for charging fuel, poking and inspecting the fire. Opening the doors for reasonable periods does not affect the quality of the gas, so charging hoppers are unnecessary. Poke holes at the fire line on the side of the shell admit poking all the way through horizontally, and since the fire can be poked from above all the way through the ashes and also observed at will through side holes in the top doors, it is practical for the operator to judge conditions without any uncertainty. Since the draft is downward, all but the volatile tar is consumed in the fire. Ashes are removed through the water seal bottom.

The Cooler

The cooler consists of two legs which are iron pipe mounted vertically and containing sprays, connected by a water seal trap, and each leg has a direct water-sealed drain into the water pit. Gas from the accumulation chamber passes upward through the first leg, thence through the connecting water seal and downward through the second leg to the coke scrubber. In the cooler the gas is thoroughly sprayed with cool water; gaseous tar is precipitated and washed out, along with dust, lamp black and other impurities, through large direct water-sealed drains into the water pit. The seal trap is dry during operation, being filled with water only to cut off the generator from the rest of the system.

Combined Scrubber and Purifier

The combined scrubber and purifier is embodied in a cylindrical steel shell divided into two compartments

by a diaphragm which extends from top to bottom. Near the bottom of the first compartment is a cast iron grate which supports loose coke. Gas enters from the cooler below the grate and in its upward passage meets finely divided water from the sprays above. A downtake riveted to the diaphragm leads the gas downward again and introduces it through an opening in the diaphragm to the lowest compartment of the purifier. The gas then rises through several layers of sawdust supported on perforated trays and radiates its excess heat through the diaphragm to the cooling water in the scrubber, so that when it reaches the outlet, which is connected through the exhauster and pipe line to the engine, it is cool and clean.

The scrubber drains directly into the water pit. As in the cooler, the sprays are designed for ready removal and inspection. The scrubber grate is hinged, swinging downward upon removal of a support, thus facilitating removal of coke through the doors below. The purifier is provided with several changing and filling doors opposite each tray, so that trays and contents can be inspected and renewed when necessary.

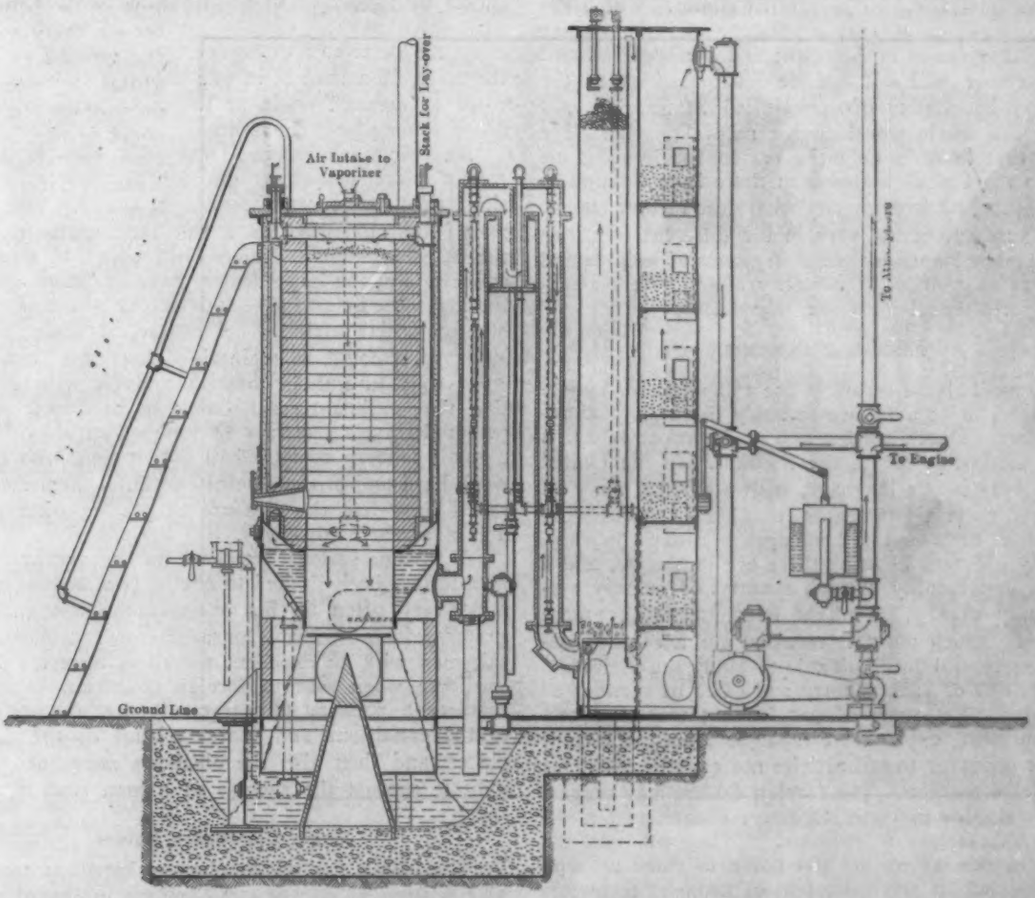


Fig. 2.—Sectional Elevation of the Akerlund Bituminous Gas Producer.

Exhauster and Auxiliaries

The function of the exhauster is to create the draft through the system. The Akerlund producer runs with a comparatively low suction, which renders unnecessary a high power expansion exhauster. The exhauster delivers gas into a small expansion tank (about 20 cu. ft. per 100 hp.), the outlet of which leads to the engine. A by-pass from this outlet back to the suction side of the exhauster is regulated by a poppet valve which can be set accurately from the outside and adjusted to deliver gas at any desired pressure. Some Akerlund installations employ a gasometer with a butterfly regulating valve in a by-pass, but the adjustable poppet valve gives best results.

The standard Akerlund installation provides a power pump for circulating water so that most of it can be used repeatedly, reducing the necessary supply to about 5 gal. per hp. hour. The pump is driven from the same countershaft which drives the exhauster and the air compressor included in the engine starting outfit. The countershaft is started by an electric motor or small gasoline engine, and is thrown on the main engine as soon as that has been started. The total power required for all auxiliaries does not exceed 2 per cent. of the capacity of the plant.

Advantages and Results

With reference to the most important points to be considered in connection with soft coal gas producers the following advantages are claimed for the Akerlund design: A constant supply of uniform gas from commercial bituminous coal; gas of proper density and free from impurities which will impede the action of the engine; easy circulation and low suction through the entire system which insures a quick response from the fire to every demand from the engine, thus obviating the necessity of a large storage tank in addition to the gas regulator, and a strictly mechanical design throughout, with simplicity which makes possible easy operation with minimum attention.

In practice the Akerlund producer seems to fulfill the claims of the manufacturer. Plants in operation with hitherto inexperienced attendants are running continuously and satisfactorily. The coal consuimption is about 1 lb. per brake horsepower hour, including lay-over periods. These results have been obtained with Tennessee, Alabama and Virginia soft coals, including several grades of nut and run of mine. The gas maintains an average minimum of 125 B.t.u. per cubic foot.

In one instance the exhauster was speeded up and surplus gas blown to the atmosphere as a test for the cooling and scrubbing apparatus. The producer (a 250-hp. unit) developed 75 per cent. overload for several days continuously, maintaining an even quality of gas, without delivering any impurities to the engine.

The Akerlund producer is built in single units up to 500 hp. Beyond this capacity the units are combined into batteries.

Foreign Trade Methods

BY WILLIAM J. A. BAILEY, NEW YORK.

Having traveled in most of the countries of the world, both north and south of the equator, selling to all classes of trades, placing agencies, opening up new fields and studying local conditions and trade requirements from many points of view, I have had opportunity to observe the workings of the various methods employed by manufacturers to secure trade abroad.

Too many manufacturers choose to regard foreign trade as something mystical and of doubtful importance; but it is just as easy to do business in China or Peru as it is here in the United States. The large dealer abroad is just as intelligent and progressive as the large dealer in America; and the broad-minded manufacturer will not confine his ambitions to the arbitrary boundaries of the United States, but will regard the whole world as his natural market. He knows that there is no more reason for limiting his sales to the United States than there is to limit them to the State or county or city where the factory stands. To be sure conditions vary in the different countries and the many languages and the systems of weights and measures as well as of currency alter matters somewhat; yet after all these are only details.

Mistakes of Exporters

The most signal errors in the campaign for export trade seem to be a failure to study the individual requirements of each market and an improper selection of the method to secure the business. In the United States there is one language, with a general unity of ideas and a certain sameness from coast to coast; but abroad one finds several languages in a day's journey, as many different ideas as there are languages, and a marked individuality in each country. Monetary systems vary greatly. I might enumerate many more conditions which make it essential for a concern desiring successful foreign trade to study the individual requirements of each country and often of sections of a country. Yet some of our leading manufacturers are conducting expensive campaigns from the factory in their endeavor to sell articles not exactly suited for the foreign markets. The foreign dealers may suggest what is wanted in their respective countries; but the man at the factory is obdurate. "They will take the regular goods, as we are not going to make up anything special," is the ultimatum of many in their foreign campaigns. Such concerns are only wasting their money in these misdirected efforts and would do well to remain out of the foreign field altogether. I regard American machinery manufacturers as perhaps the most progressive, as they are usually willing to make an effort to adapt their products to conform to the standards of any country.

It is in the selection of the method of handling foreign trade that many make their most serious errors, and very often the genius that makes for success at home seems entirely lacking in foreign endeavors. The Standard Oil Company, Singer Sewing Machine Company and a very few other large concerns handle the foreign markets practically, as they operate their business in the United States, but the great bulk of manufacturers employ one or more of the methods enumerated below.

Drawbacks of Traveling Salesmen

Many makers secure good results by sending a specially equipped salesman into the various markets to call on the buyers and take orders by personal solicitation; and frequently several manufacturers combine to send a salesman out, each contributing a portion of his expenses. While this method may seem very practicable it has several disadvantages. If the salesman is handling special machinery, it is usually necessary for him to cable specifications to the factory where details may be misunderstood, causing serious confusion in making a firm offer. Then, again, if a concern, municipality or government, call for bids on anything the chances are small of the traveler being in the particular city at the right moment; and should he happen so to be he would, perhaps, have to wait there months for the opening of the bids, handling the details of the order and financing it. Furthermore, if a man is in one country he cannot also cater to demand made at the same time in half a dozen other places thousands of miles away.

Another weakness in a traveler's work is that he cannot place proper agents for his factory in the short time he generally spends in a city. The salesman is unacquainted, as a rule, and naturally seeks the more prominent dealers with whom to place the agency. But the large dealers have too many irons in the fire to be able to give satisfactory attention to any one particular article. Of course, if some sort of supervision could be maintained over the large concerns to assure their constant activity with a given line then excellent results could be produced. In my personal travels I always sought out an individual or a small concern composed of active men who had to work hard and produce results to build themselves up, and I have had the pleasure of placing some profitable agencies in this way.

A further serious drawback to the average salesman is that he is limited to one or two languages, and must very often do his business through an interpreter, which is always unsatisfactory. Sometimes a salesman with an excellent record in America proves mediocre when sent to foreign countries, because it requires a peculiar temperament to adapt one's self to the conditions and characteristics of the various places, and then also the obstacles mentioned above militate against the success of a man sent from the factory.

Export Commission Houses

The export commission houses handle a considerable portion of our export business in manufactured articles. If our manufacturers would deal direct with foreign concerns our export trade would be much larger. The commission houses are primarily buying agents for foreign concerns, though they have been the means of establishing many manufacturers in foreign markets. However, the manufacturer who places the sale of his product in the hands of a commission house must remember that this house is a buying and not a selling organization, and, while it may have done fairly good work for other manufacturers in the past in placing lines, its field has always been limited to its own particularly clients, for whom it makes purchases in America. In most cases this means a very small percentage of the entire field that it is possible to operate in.

Furthermore, manufacturers of other countries have their own salesmen located permanently in the chief commercial centers and the entire work of these representatives is to sell the goods, so that the commission houses, acting in the capacity of buying agents for the dealers, have small chance to sell goods from their New York office in competition with direct factory representatives on the ground. The commission house

is exceedingly well equipped to handle foreign shipments and to finance them, but the manufacturer should himself attend to the exploiting if he wants to get the best results.

The export or manufacturer's agent is an individual with an office in New York, who tries to induce the commission houses to find a market for the goods he represents, which is like one salesman asking a competing salesman to sell his goods for him. If the commission house were a good selling medium for any particular line the manufacturer should get in touch with it himself and by thus eliminating the export agent the expense of marketing the products abroad would be reduced by the compensation paid the agent.

Advertising Methods

Some manufacturers undertake to market their products through the medium of catalogues sent to lists of buyers. As an economical method of selling goods, this system has many advantages providing the lists are reliable and the catalogues printed in the languages of the various countries with the weights and measures in the metric system and the prices in the principal currencies. Then the maker must be prepared to correspond in several languages and conduct his sales in a long range impersonal manner which seldom brings big returns.

The export journal figures prominently in the campaign for foreign trade, but advertising in journals to discover a market is unscientific, and such publicity should be used only as an adjunct to build up a trade after the proper foundation for the business has been laid. Then I recommend using journals that circulate all over. It is to be regretted that most of them are printed in English only, which renders the paper valueless for a large portion of the world. However, magazine advertising can never do any harm and may do some good, but if a manufacturer wishes to secure returns at all commensurate with the cost of the publicity he must select his magazine very carefully. A journal that contains advertising of patent medicines and steam engines, and anything or anybody who will pay the price finds its way more often into the waste paper basket than into the hands of the man who decides on purchases. One should purchase representation only in papers that deal exclusively with one's particular trade, as this is the age of specialization the world over.

Worthless Schemes

Some manufacturers use other methods in marketing their products. Some may be good, but as foreign trade offers such varied possibilities the number of schemers in this business is legion. Perhaps their schemes cannot be characterized as fraudulent, for many of them undoubtedly mean well, but few of them accomplish any good worth mentioning. Manufacturers waste thousands of dollars yearly by being inveigled into contributing to the support of impossible schemes. I cannot begin to enumerate them, but various guides, catalogues in several languages sent to consuls, &c., are types of propositions offered to makers which, in my opinion, from personal observation, border on the gold brick order of things. Before a manufacturer pays a dollar for any such inviting plans to extend his trade he should consult reliable authorities to ascertain their true value. Even though well-known men lend their names to the furtherance of these propositions, no maker should be misled into contributing a penny unless he assures himself through the proper channels that the work itself is of sterling worth.

Missionary Work Needed

To give any set rules for the establishment of an export trade is impossible, for different products need different methods, differently applied in the various countries. The main thing is to get established on a firm footing in each place. This embraces considerable missionary work in studying the markets carefully, ascertaining what competition there is to meet, in what manner the particular markets may want an article, the prospective demand in each place, terms current, methods of doing business, &c. Before a manufacturer enters a new market and begins to solicit orders he should spend a year studying that market, so that he knows best how to handle it.

One way which has been found quite successful is for a manufacturer to ally himself with a concern having established sales offices in all the principal cities. Such a concern could take over the entire export sales end of the business, and each of its salesmen would represent the factory exactly as the manufacturer would expect his own salesmen to represent him should he station one at each commercial center throughout the world. These salesmen would do even better than the manufacturer's own men, because each one is usually a resident for many years in the particular country where he operates and thus understands local conditions thoroughly, knows the buyers, speaks their language, and is always on the ground ready to take immediate advantage of every sales opportunity and following up every bit of business.

The Vanadium-Alloys Steel Company

The Vanadium-Alloys Steel Company is located in the eastern section of Latrobe, Pa., where it has over 25 acres of land with a switch to the Pennsylvania Railroad. On July 5 the company melted its first steel in its crucible department, and the result was very satisfactory, as indicated by tests made both in the laboratory and on a machine tool. The company at the outset has 48 crucible melting furnaces in which it will manufacture Red Cut high speed steel and Special crucible steel. Its first order calls for vanadium steel, which is now being filled. The present capacity of the plant is about 2800 tons of tool steel per annum.

The buildings of the plant cover about two acres. The equipment, besides the furnaces above mentioned, includes the following: One 12-in. rolling mill driven by a large Westinghouse alternating current motor, a complete hammer shop, boiler house with 200-hp. boilers, one box annealing furnace of the Wm. Swindell & Brothers type, laboratory, stock department, office building, &c.

E. T. Edwards, formerly with the Firth-Stirling Steel Company, Demmler, Pa., in charge of its melting department, is president and general manager of the Vanadium-Alloys Steel Company, while D. T. Sipe, for 15 years in charge of the furnaces in the melting department of the Firth-Stirling Steel Company, where that company's line of Blue Chip steel is made, is superintendent. The laboratory is also in charge of a former Firth-Stirling employee. Each of these well qualified men will use his experience to get out a high quality product. The company has already established a sales agency in Cleveland and for New England, and is open to engagements with reputable representatives in other sections who can take the agency on an exclusive basis. Later on the new company will establish a line of stock warehouses in certain parts of this country, and it will also seek export trade. All communications should be addressed to Latrobe, Pa.

According to the regular monthly report of the Relief Department of the Pennsylvania Railroad, the sum of $177,386.24 was paid to members during the month of May, 1910. Of this amount, $120,513.10 represents the payments made on the lines east of Pittsburgh and Erie, and $56,873.14 on the lines west. Since the establishment of the funds a total of $28,469,890.15 has been paid out.

CURRENT METAL PRICES.

The following quotations are for small lots. Wholesale prices, at which large lots only can be bought are given elsewhere in our weekly market report.

IRON AND STEEL—

Bar Iron from store—

Refined Iron:

1 to 1¾ in. round and square; 1½ to 4 in. x ¼ to 1 in. ..... ₩ lb 1.90¢
1½ to 4 in. x 1¼ to 5-16 ..... ₩ lb 2.10¢
Rods—⅜ and 11-16 round and square ..... ₩ lb 2.10¢

Angles: Cts ₩ lb

3 in. x ¼ in. and larger ..... 2.10¢
3 in. x 3 16 in. and ⅛ in. ..... 2.55¢
1½ to 2½ in. x ¼ in. ..... 2.10¢
1½ to 2¾ in. x 3-16 in. and thicker ..... 2.10¢
1 to 1¼ in. x 3-16 in. ..... 2.20¢
1 to 1¼ x ⅛ in. ..... 2.30¢
⅞ x ¼ in. ..... 2.10¢
¾ x ⅛ in. ..... 2.50¢
⅝ x ¼ in. ..... 3.55¢
⅛ x 3-32 in. ..... 4.55¢

Tees:

1 in ..... 2.65¢
1¼ in. ..... 2.15¢
1½ to 2½ x ¼ in. ..... 2.15¢
1½ to 2½ x 3-16 in. ..... 2.35¢
3 in. and larger ..... 2.15¢

Beams ..... 2.10¢
Channels, 3 in. and larger ..... 2.10¢
Bands—1½ to 6 x 3-16 to No. 8 ..... 2.30¢
"Burden's Best" Iron, base price ..... 3.15¢
Burden's "H. B. & S." Iron, base price ..... 2.95¢
Norway Bars ..... 3.60¢

Merchant Steel from Store—

per ₩

Bessemer Machinery ..... 1.90¢
Toe Calk, Tire and Sleigh Shoe ..... 2.50@3.00¢
Best Cast Steel, base price in small lots ..... 7¢

Sheets from Store—

Black	One Pass, C.R. Soft Steel.	R. G. Cleaned.
No. 16	₩ lb 2.90¢	3.00¢
Nos. 18 to 21	₩ lb 2.95¢	3.10¢
Nos. 22 and 24	₩ lb 3.05¢	3.20¢
No. 26	₩ lb 3.10¢	3.30¢
No. 28	₩ lb 3.20¢	3.50¢

Russia, Planished, &c.

Genuine Russia, according to assortment, ... ₩ lb 12 @14½
Patent Planished, W. Dewees Wood, ₩ lb A, 10¢; B, 9¢ net

Galvanized.

Nos. 14 to 16 ..... ₩ lb, 3.20¢
Nos. 22 to 24 ..... ₩ lb, 3.55¢
No. 26 ..... ₩ lb, 3.75¢
No. 28 ..... ₩ lb, 4.10¢

No. 20 and lighter 36 inches wide, 25¢ higher.

Genuine Iron Sheets—

Galvanized.

Nos. 22 and 24 ..... ₩ lb ..5.75¢
No. 26 ..... ₩ lb ..6.25¢
No. 28 ..... ₩ lb ..7.25¢

Corrugated Roofing—

2½ in. corrugated.		Painted	Galvd
No. 24	₩ 100 sq. ft.	$3.85	4.80
No. 26	₩ 100 sq. ft.	2.95	4.00
No. 28	₩ 100 sq. ft.	3.60	3.75

Tin Plates—

American Charcoal Plates (per box.)

"A A A." Charcoal:
IC, 14 x 20 ..... $6.35
IX, 14 x 20 ..... 7.60
A. Charcoal:
IC, 14 x 20 ..... $5.40
IX, 14 x 20 ..... 6.50

American Coke Plates—Bessemer—
IC, 14 x 20 ..... 107 lb $4.40
IX, 14 x 20 ..... 5.40

American Terne Plates—
IC, 20 x 28 with an 8 lb. coating $8.50
IX, 20 x 28 with an 8 lb. coating 10.50

Seamless Brass Tubes—

List November 13, 1908. Base price 18¢

Brass Tubes, Iron Pipe Sizes—

List November 13, 1908. Base price 18¢

Copper Tubes—

List November 13, 1908. Base price 22¢

Brazed Brass Tubes—

List August 1, 1908. 19½¢ ₩ lb

High Brass Rods—

List August 1, 1908. 14½¢ ₩ lb

Roll and Sheet Brass—

List August 1, 1908. 14½¢ ₩ lb

Brass Wire—

List August 1, 1908. 14½¢ ₩ lb

Copper Wire—

Base Price, Carload lots mill 14 ¢

Copper Sheets—

Sheet Copper Hot Rolled, 16 oz (quantity lots) ₩ lb 8 ¢
Sheet Copper Cold Rolled, 1¢ ₩ lb advance over Hot Rolled.
Sheet Copper Polished 20 in. wide and under, 1¢ ₩ square foot.
Sheet Copper Polished over 20 in. wide, 2¢ ₩ square foot.
Planished Copper, 1¢ ₩ square foot more than Polished.

METALS—

Tin—

Straits Pig ..... ₩ lb 34½@35¢

Copper—

Lake Ingot ..... ₩ lb 14¾@15 ¢
Electrolytic ..... ₩ lb 14¾@15 ¢
Casting ..... ₩ lb 14¼@14¾¢

Spelter—

Western ..... ₩ lb 6¼@6½¢

Zinc.

No 9, base, casks ..... ₩ lb 8 ¢ | Open ..... ₩ lb 8½¢

Lead.

American Pig ..... ₩ lb 5 @5¼¢
Bar ..... ₩ lb 6⅝@6¾¢

Solder.

½ & ½, guaranteed ..... ₩ lb 22 @23½¢
No. 1 ..... ₩ lb 19 @19½¢
Refined ..... ₩ lb 17½@17¾¢

Prices of Solder indicated by private brand vary according to composition.

Antimony—

Cookson ..... ₩ lb ..@10¢
Hallett's ..... @10¢
Other Brands ..... @9½¢

Bismuth—

Per. lb $2.00@$2.25

Aluminum—

No. 1 Aluminum (guaranteed over 99% pure), in ingot for remelting ..... 31¢
Rods & Wire ..... Base Price 31¢
Sheets ..... Base Price 33¢

Old Metals.

Dealers' Purchasing Prices Paid in New York

	Cents
Copper, Heavy cut and crucible ..... ₩ lb	10.25@10.5
Copper, Heavy and Wire ..... ₩ lb	10.00@
Copper, Light and Bottoms ..... ₩ lb	9.00@9.25
Brass, Heavy ..... ₩ lb	6.75@
Brass, Light ..... ₩ lb	5.50@ 5.75
Heavy Mechine Composition ..... ₩ lb	9.25@ 9.50
Clean Brass Turnings ..... ₩ lb	6.75@ 7.00
Composition Turnings ..... ₩ lb	8.00@ 8.25
Lead, Heavy ..... ₩ lb	.....@ 3.50
Lead, Tea ..... ₩ lb	.....@ 3.25
Zinc Scrap ..... ₩ lb	.....@ 3.75

Nicholson Files

Sales of good files should remind you
You can all avoid a "rut" —
Just by stocking up and selling
Files like these that *always cut.*

Some Hardware merchants get in the "rut" of stocking any kind of files just because they are *cheap.* But such files don't *sell* and are "dead stock" on their shelves.

TRADE NICHOLSON MARK
U.S.A.

Nicholson File Company, Providence, R. I.